OVERSEAS EDITION
AUGUST 1955

McGRAW-HILL DIGEST

INTERNATIONAL BUSINESS AND INDUSTRY

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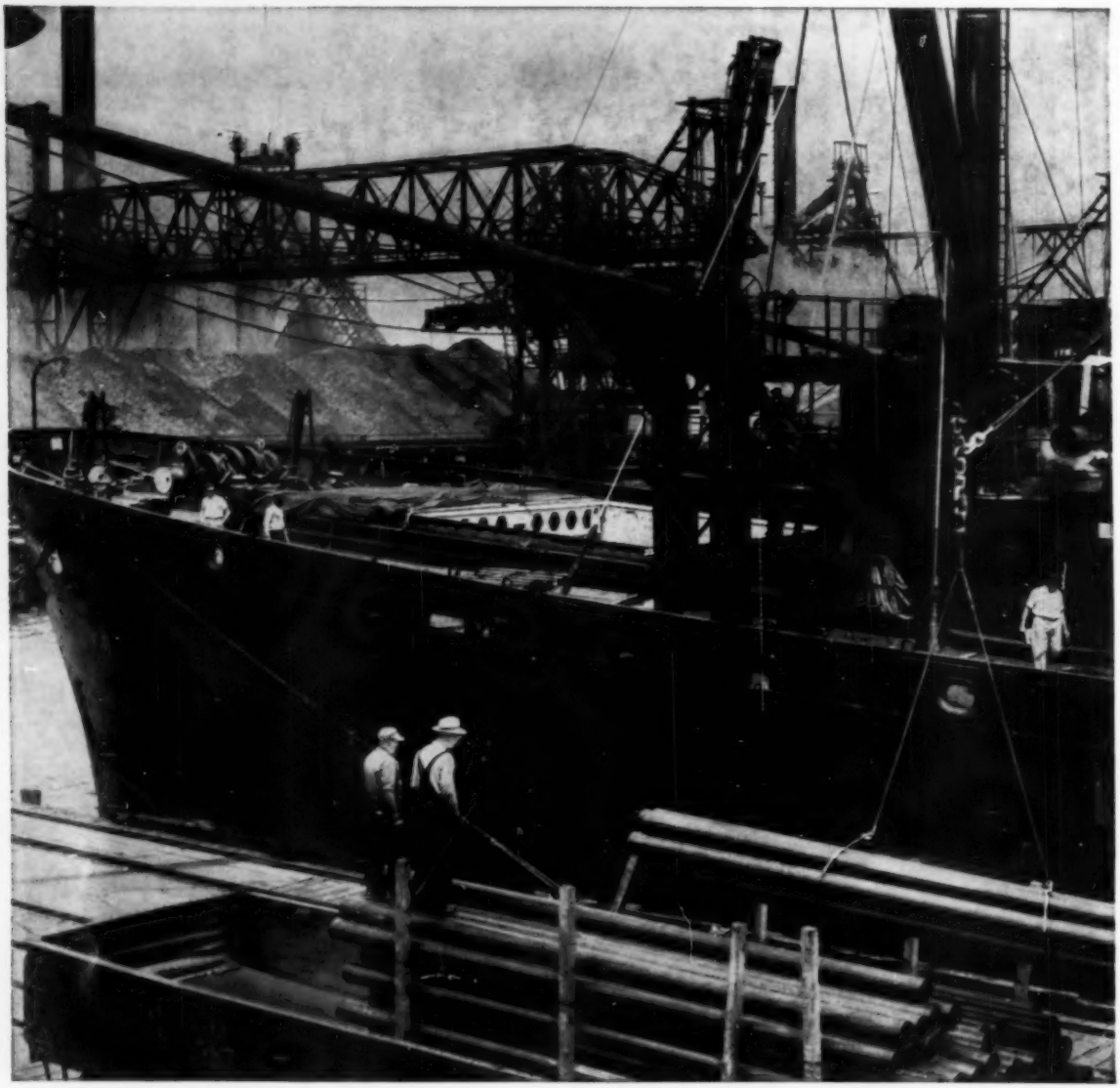

From the Steel Mill right into the Ship

Bethlehem's great Sparrows Point plant in the Port of Baltimore, U.S.A., is the world's largest steel mill located on tidewater. Products for export can be loaded at this plant directly aboard ship—an arrangement with twin benefits to the purchaser.

First, it eliminates the delays caused by long overland freight hauls.

Second, it minimizes the possibility of damage by greatly reducing the handling required.

Our Sparrows Point plant has served the export market for years. With its tidewater location, it can quickly have your order on the way—thereby saving days or even weeks. Bethlehem Steel Export Corporation, 25 Broadway, New York 4, U.S.A. Cables: "BETHLEHEM, NEWYORK."

Bethlehem supplies steel to world markets in all forms, including

BARS ★ ALLOY STEELS ★ TOOL STEELS
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WIRE PRODUCTS ★ RODS ★ RAILS

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702E

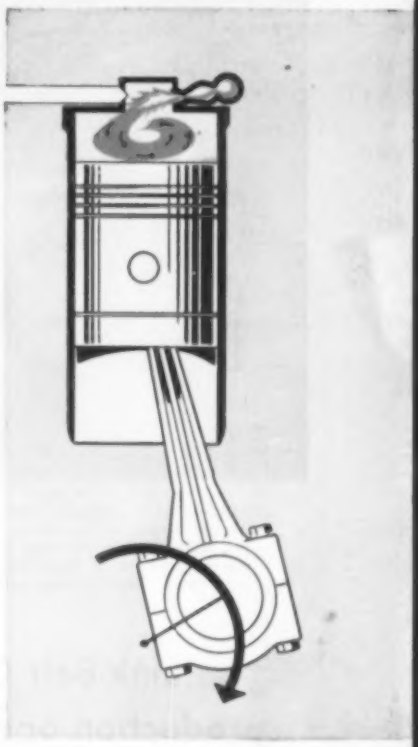
The New Allis-Chalmers Power Unit Line Delivers LOWER COST POWER

Allis-Chalmers diesel power units provide more efficient engine performance and extra long life. A unique system of combustion is responsible for this outstanding performance. Here is how it works —

The metered charge of fuel is injected directly into the main combustion chamber, and a predetermined amount enters the small energy cell. Ignition begins in the main combustion chamber and then ignites the mixture in the energy cell, creating a swirling vortex of air, fuel and hot burning gases as it leaves the energy cell. This progressive burning of the charge results in controlled combustion . . . and an *extra* power impulse *after* the piston starts downward on the power stroke. As a result, no fuel is wasted. Sudden shocks on moving parts of the engine are avoided.

In addition, Allis-Chalmers power units are designed with seven main bearings, rigid blocks, replaceable cylinder sleeves, removable valve guides, full-pressure lubrication — all contributing to dependable, continuous, long-life performance.

Consult the Allis-Chalmers dealer in your area for complete information.



Five sizes of Allis-Chalmers diesel power units — ranging from 15 to 197 brake hp — are available as open style or enclosed units. They are compact and are easily installed for such work as pumping water, operating sawmills, compressors, generators, and doing many other jobs that require dependable, low-cost power.

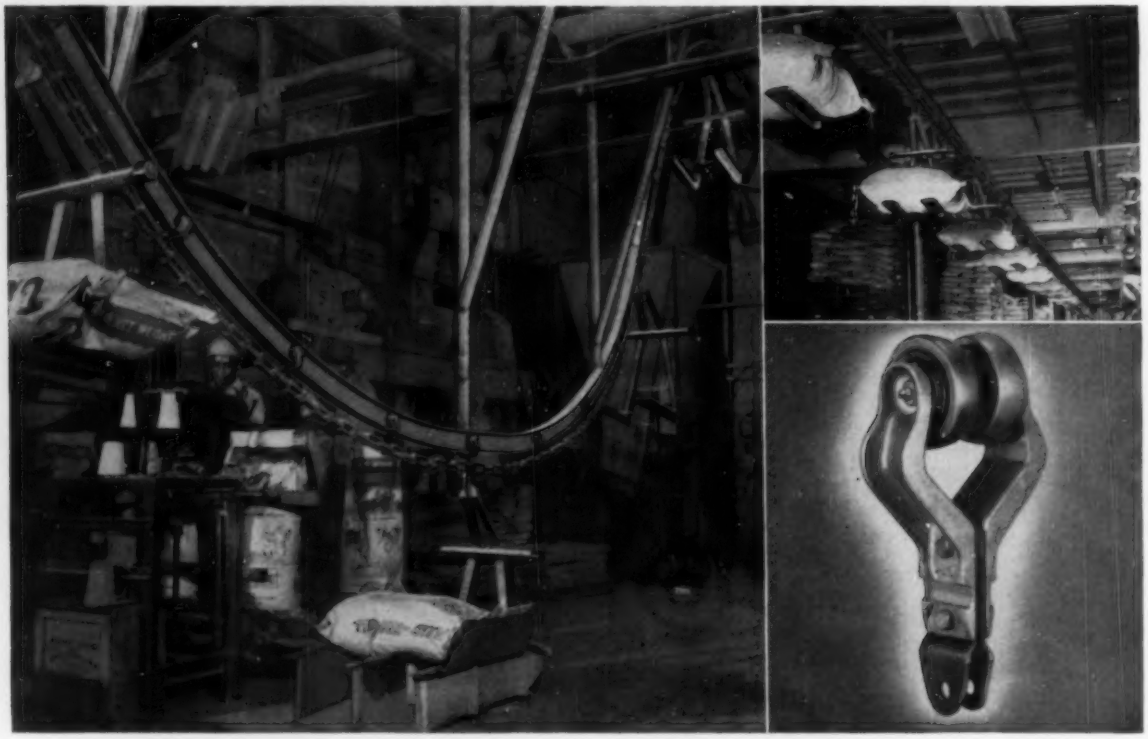
Illustrated: Model D-779

6-cylinder diesel
140 brake hp at 1400 rpm
779 cu in displacement

ALLIS-CHALMERS

DEPT. MH855 — TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

BUILDERS OF MACHINERY SINCE 1847



Large feed warehouse uses 858-ft. Link-Belt Overhead Trolley Conveyor system to handle 25,000 lbs. of feed per hour. At left, two-fingered carrier dips, picks up bag, continues to one of seven rail loading stations or separate truck dock. There's no floor congestion as bags move through warehouse to dock (top right). Also shown is the new, highly efficient and long-wearing Link-Belt ball bearing trolley—now available for new conveyor systems and replacements. It is made in bolted or riveted models in popular sizes.

Link-Belt Overhead Trolley Conveyors coordinate production operations, allow processing in transit, provide

fast, low-cost materials handling

Old and new plants are today achieving impressive savings in materials handling through installation of mechanized conveying systems. And Link-Belt Overhead Trolley Conveyors are a popular answer for many who are seeking the benefits of this method of handling. With a variety of available attachments, they can provide pickup of materials . . . allow processing while en route to storage or shipping—all with no demand on valuable floor space. Such continuous operations can even involve several floors of the same building—or separate buildings.

Besides a new, advanced trolley design, Link-Belt offers you other vital cost-saving advantages. Materials handling is a Link-Belt specialty—and a system planned for you is evolved from long experience. And in an installation that must move upward, downward, to either side—close to the ceiling for headroom or down to a working area—that background is certain to pay off in greater design efficiency.

In fact, whatever you need in materials handling or power transmission, Link-Belt offers you unmatched breadth of line and depth of experience. Call your Link-Belt representative for details or write for Books 2330 and 2536 to LINK-BELT COMPANY, Dept. MHD, 2680 Woolworth Bldg., New York 7, N. Y.

LINK-BELT

19.754-E

One source . . . one responsibility

for materials handling | power transmission | processing machinery

McGRAW-HILL DIGEST

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Bundy solves refrigeration problem with unique tubing strainer design

Read how Bundy Engineers work with designers to help make better products

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But, for *you*, there is more than manufacturing going on at the Bundy Tubing Company.

Shown at the right is a typical example of the help you can get at the design stage of your product. It is just one of hundreds of contributions which have been made by our engineering staff, in many widely diversified fields.

Take advantage of this unbeatable Bundy combination: expert, free engineering service plus genuine Bundyweld Tubing, the only tubing double-walled yet stronger; has high thermal conductivity, high bursting strength; takes easily to any fabricating operation. It is the safety standard of the refrigeration industry, *and is used in 95% of today's cars, in an average of 20 applications each.*

Let Bundy help you with that tubing design problem. Call, write, or wire us today:

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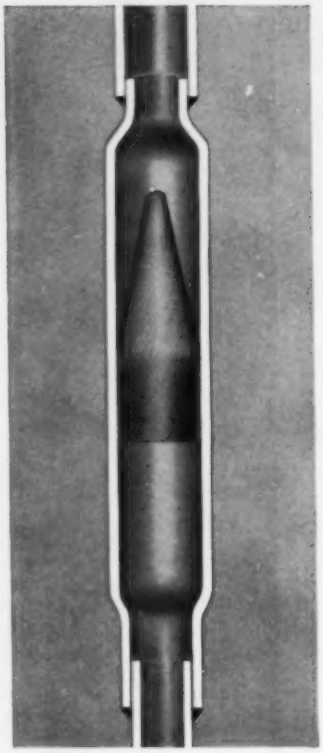
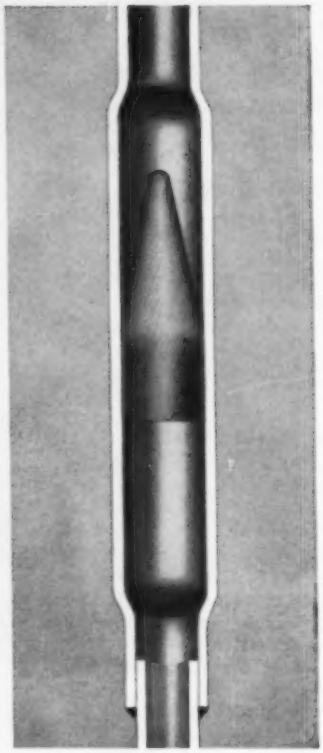


Problem: Because refrigeration systems can be quickly ruined by dirt particles which lodge in capillary tubes, most systems use a separate strainer assembly, as shown above. The two extra solder joints used to install the strainer assembly give rise to an even greater problem—leakage. Expensive hand assembly methods also frequently introduce dirt into the system.



Solution: New Bundy design actually makes strainer an integral part of condenser coil. The coil end is expanded to receive the strainer or filter and then swaged down to capillary size. This ingenious design eliminated one solder joint with its consequent risk of leakage or dirt inclusions; resulted in a cost savings of 50% to the customer.

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Bundyweld starts as a single strip of copper-coated steel. Then it's . . .
continuously rolled twice around laterally into a tube of uniform thickness,
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BUNDYWELD TUBING®

DOUBLE-WALLED FROM A SINGLE STRIP

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- Takes plating
- Shock-resistant
- No inside bead
- Uniform I.D., O.D.

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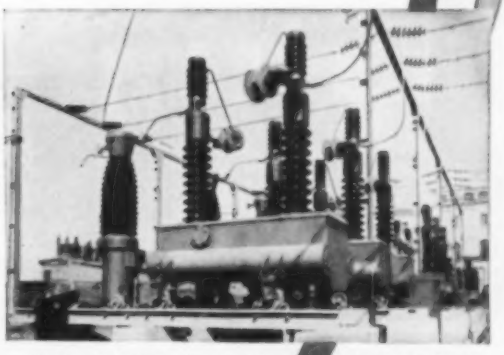
ELECTRICAL ENGINEERING

Electric traction gives greater speed with economy

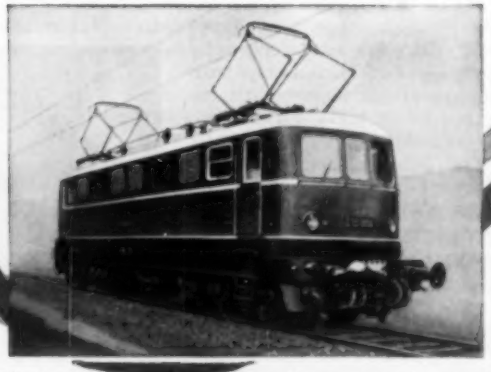
Constant-tension trolley system
for service speeds up to 160 km/h

Better acceleration
Increased speed
Greater haulage capacity
Improved energy balance

On these counts, electric traction pays dividends, particularly so when railway electrification is made our responsibility. The AEG continues, over fifty years, as a notable engineering supplier for major d. c. and a. c. railways.



H. V. switchgear of an outdoor traction substation



Single-phase a. c. Bo' Bo' locomotive, max. service speed
130 km h, total motor rating 4700 HP

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means
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ALLGEMEINE ELEKTRICITÄTS - GESELLSCHAFT

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Mutual Home Federal has grown steadily since 1888

Mutual Home Federal foils *paperwork* holdup

Providing more customers with more services was causing a *paperwork* holdup at the Mutual Home Federal Savings and Loan Association of Grand Rapids, Michigan.

Determined to bring their accounting system up to date, the management of Mutual Home Federal called in the Burroughs man.

After careful study, it was agreed to install a modern mechanized accounting system. This included *complete* front office, window posting and unified accounting built around four new Burroughs Sensimatics.

Result? Efficiency was stepped up immediately. Peak loads disappeared. Posting dividends requires half the time and effort previously needed. The outstanding service provided by this fast, accurate, and economical mechanized system has pleased the Association's management, personnel *and* customers.

Can your business profit from faster facts? Your local Burroughs man offers experienced advice on modern business machine methods, complete service. For his address, write to: Burroughs Corporation, Detroit 32, Michigan, U.S.A.

"Your machines pay for themselves," Mr. Harold O. Swanson, Vice Pres. and Sec'y of Mutual Home Federal, tells Mr. Pierson (right), the Burroughs man.

Call in your local Burroughs man

U. S. BUSINESS TRENDS

ADDED INCENTIVES . . .

. . . to motivate the businessman, the investor, and the consumer represent the backbone of economic thinking in Washington today. Incentives are helping to maintain prosperity.

Businessmen and investors have been given economic concessions: (1) an "easier" and bigger supply of money with which to work; (2) tax reductions, especially repeal of the excess profits tax (over 18 months ago); (3) easier taxation of dividends; (4) faster depreciation of capital expenses, thus reducing taxes; (5) the right to treat development and research items as business expenses, also reducing taxes; (6) a chance to participate in the atomic energy program.

Consumers also have been given concessions: modest tax reductions, government-encouraged price stability, easy consumer credit, and easy credit rules affecting real estate.

The result has been confidence—faith in the future—shown on all fronts, as evidenced by these latest facts and figures covering:

- **Increased plant and equipment spending:** businessmen are following through on bigger plans than expected. During the third quarter they will at least equal the best rate, set in 1953.
- **Record number of new corporations:** this year's total will probably top the 1946 high mark.
- **Record in new home building:** private construction in 1955—largely new homes—will surpass the old record established in 1954 by 14%.

Thus, **added incentives help make the present boom more understandable—more secure.** Final note of proof: unemployment now stands about 25% below last year's level.

ATOMIC ECONOMY . . .

. . . is becoming an ever-more realistic prospect, is greatly needed by the world. Thus, businessmen must see that peacetime industrial uses of the atom are developed efficiently and promptly. That was the theme of a major speech delivered recently before a conference of the American Management Association.

"We live," said the speaker, Dean John Dunning of Columbia University's Engineering School, "in an energy-dependent civilization. **Worldwide need for atomic energy is acute.** The atom—the atom alone—promises the degree of world industrialization that is so desperately required by humanity."

The response of the world's business community—a substantial answer to the Dean's plea—**comes in full-force at a 63-nation conference in Geneva this month. It's the United Nations Conference on Peaceful Uses of Atomic Energy.** The United States, Britain, Italy, West Germany, the Netherlands, Switzerland, and Russia are each sponsoring commercial atomic exhibits.

Despite description of the conference as "noncompetitive," it's a certainty that **atom-conscious governments and businessmen will strive to place themselves in strategic position to capture part of the expected nuclear export market.**

IMPORTS WILL EXCEED EXPORTS . . .

. . . by 1960. That is the major long-term shift in the foreign-trade position of the U. S. predicted by the Twentieth Century Fund, as a result of its extensive survey (McG-H Digest, June, p7).

Africa, the Far East, Latin America, and the Middle East will enjoy a dollar surplus, the report finds. Western Europe will continue to have a trade deficit.

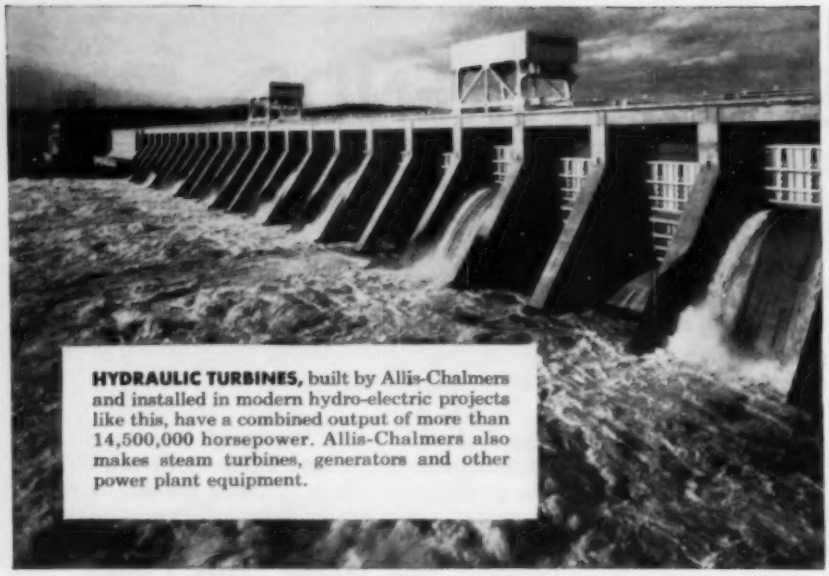
Chief reason for this forecast is that such imports into the U. S. as iron ore, crude oil, and bauxite will increase up to 300% during the next few years. This will happen because huge quantities of raw materials will be needed to sustain the ever-increasing American output of goods and services. But there will be no balancing factor. The over-all volume of U. S. trade will show little change by 1960.

GUARANTEED ANNUAL WAGE . . .

. . . has been greeted by American businessmen with reactions ranging from non-concern to out and out shock. Most businessmen believe that "GAW"—recognized in principle by Ford and General Motors when they agreed to supplement the incomes of laid-off workers—**will cause trouble.**

They see: (1) **price increases;** (2) **pressures put on small competitors;** (3) **curtailed production**—less willingness to pursue ambitious plans; (4) **a decrease in the number of jobs** due to nonhiring of marginal workers.

Optimistic souls point to the fact that a few concerns in past years have learned to live with GAW—Proctor and Gamble (soap), Nunn-Bush (shoes), Hormel (meats). In any case, **GAW could prove to be a hollow victory for the unions.** It runs counter to unemployment compensation laws in most of the 48 states.

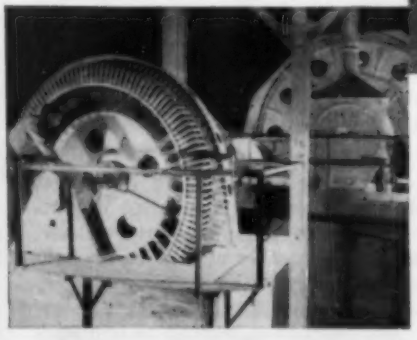


HYDRAULIC TURBINES, built by Allis-Chalmers and installed in modern hydro-electric projects like this, have a combined output of more than 14,500,000 horsepower. Allis-Chalmers also makes steam turbines, generators and other power plant equipment.

Keeping pace with growing power needs

When London got its first underground railway in 1897, Allis-Chalmers built the power generation equipment. Today, Allis-Chalmers is still a leader in power generation, distribution and utilization equipment—is one of the world's great suppliers of the equipment shown here.

UNIT SUBSTATIONS are used in many industries as a safe, practical way to bring high voltage close to the load center, to reduce voltage drop and improve efficiency. Unit Substations are only one of the many types of power-distribution apparatus built by Allis-Chalmers.



ELECTRIC MOTORS are the prime movers of modern industry. As a major motor manufacturer for over 50 years, Allis-Chalmers has produced units ranging in size from ½ to 35,000 horsepower. Here you see a 600-horsepower Allis-Chalmers synchronous motor being used to drive a grinding mill.

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BASIC MACHINERY FOR THE WORLD'S MAJOR INDUSTRIES

ALLIS-CHALMERS DISTRIBUTORS ARE LOCATED THROUGHOUT THE WORLD

The Allis-Chalmers distributor in your country is ready to give you as much help as you *want or need*. He is backed by complete Allis-Chalmers engineering, research and testing facilities. These services are readily available to you, your staff and your consulting engineers to determine the most profitable means of operation and to help you select the most efficient equipment that exactly meets your needs.

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BURMA—Rangoon.
CANADA—Montreal.
CHILE—Santiago.
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TURKEY—Istanbul.
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C-5725G

INTERNATIONAL TRENDS

WASHINGTON—

Trade between the Communist bloc and the West will expand greatly this year. The U. S. will double its 1954 trade with Russia and Eastern Europe. This trend will gain much momentum in the period ahead.

Moscow evidently has reversed its policy of keeping satellite nations dependent on the U. S. S. R. The satellites are being permitted to order goods from the West, as first evidenced by a Bulgarian order for 500 Chevrolet cars.

Moreover, Russia is ordering many consumer items and much light industrial equipment from Western Europe.

President Eisenhower's Council on Foreign Economic Policy has reviewed the U. S. position on East-West trade. There will be no major policy shift soon. Expanded trade will be carried out under existing regulations—for the present. Embargo lists will not be further trimmed at this time.

Peace and poverty lie behind Russia's desire to extend East-West trade. Their trade program, Washington believes, is part of a well calculated peace drive. In addition, economic shortages in the U. S. S. R.—especially those caused by their crisis in agriculture—have put pressure upon the Kremlin.

Two internal problems will hold back the Russians. The first and most serious is an acute shortage of surplus goods and commodities to export, in payment for imports. The second is their cumbersome and rigid trading system.

TOKYO—

The moderate prosperity of the average Japanese businessman today is based on a shaky foundation. The main props under the economy have been credit and an improved trade balance. He can no longer depend on either of these.

Japanese firms are operating mostly on borrowed money; 63% of their total operating capital is external—mostly loans. Thus, **when the government launched a deflationary program in 1954 to improve Japan's trade balance, many weaker companies were forced out of business.**

By the end of 1955, Japanese-owned industrial equipment and working capital will exceed last year's figure by about 16%. Bulk of the new funds will come from private sources.

If Japan's balance of payments turns unfavorable this year (which is quite possible), many more smaller concerns may suffer greatly. A favorable balance of payments of $50-million is the most that can be expected. Many observers say this estimate is highly optimistic.

Exports are expected to drop in a number of key areas, especially to Brazil, Argentina, Thailand, Burma, Indonesia, and Korea. The hope is that these reductions can be compensated by increased exports to the U. S. and Canada. Exports to sterling areas will remain the same.

Textile export prospects are bad. Cotton fabric export will drop from 1.3-billion yards in 1954, to 1.1-billion yards in '55.

Plant equipment exports may drop slightly, although ships and rails are on the increase. Ships will jump, in export value, from $46-million in 1954 to about $75-million this year.

Chemical exports will rise slightly because of bigger shipments of fertilizer—from $25-million in 1954 to $35-million. **Cement exports may increase.**

Petro-chemicals is the only important new industry to be developed or planned this year—thus far. A $20-million investment is planned.

GATT trade agreement (General agreement on Tariffs and Trade), expected to increase Japan's exports by about $40-million yearly, **did not come in time to help out this year.**

RIO DE JANIERO—

European investors, seeking new opportunities in Latin America, are exploring Brazil with enthusiasm and confidence. Germans, French, and English are most active. Japanese, too, are interested. **Present investors include:**

A group of German bankers wants to invest $1-billion. Half would go into a new railroad to transport ores. Meantime, Volkswagen, Mercedes-Benz, and REI-Chemie are all busy with new Brazilian projects.

A French industrial group, Schneider-Creusot, is also considering a $1-billion investment, chiefly a large heavy-machinery plant.

A British concern, Automatic Telephone and Electric, is building a telephone equipment plant.

Japanese textile firms, Omi, Toyo, Kanegafuci, are building new factories.

American businessmen, surprised by the aggressive attitude of Europeans, **will not lose their position.** Twenty-seven U. S. concerns invested last year; the pace of investment will continue. Total U. S. companies in Brazil is now 120.

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AUGUST 1955
VOLUME 10 • NUMBER 8

McGRAW-HILL
DIGEST

Operations Research:
Scientific Approach to Management

DIGESTED from Chemical Week, May 21, p42—Executives, who often have had to make their decisions by intuition, by guesswork, now have a new navigational aid. It's called *Operations Research*.

Some people call it scientific common sense. Others describe it as a scientific philosophy. Essentially, it's the scientific study and analysis of management problems for the purpose of increasing the effectiveness of a company's over-all operation.

Using Operations Research, executives have been able to:

- Cut waiting time at tool cribs, loading terminals, cafeterias.
- Obtain the best balance between inventory levels and production schedules, capital costs, and customer service.
- Speed up interplant communications.
- Minimize production costs during market fluctuations.
- Direct promotion dollars into channels of maximum return.
- Send salesmen to the right accounts at the right time.
- Increase yield and decrease waste in operations.

Typical examples: Operations Research in a raw-materials operation raised yield 40 to 50%. At a terminal point, it increased loading rate by 50%. In a fermentation operation subject to frequent emergency activity, it cut waste, overages, and shortages; it reduced inventory level 50%; and it boosted net income 30 to 100%, all by setting production at twice the maximum sales.

Operations researchers hope to make the method standard practice at all levels of decision making. By providing the executive with an ob-

Where Operations Research Can Help You

If the problem is in . . .	Operations Research can show you . . .			
Marketing	how much to spend on sales promotion	the best way to allocate your sales-promotion dollar	when to send salesmen to individual accounts	the best incentive system for salesmen
Production	how to schedule equipment for minimum operating time	how to combine raw materials for maximum yield	how to set up schedules that reflect current market conditions	how to increase process efficiency
Advertising	the best way to spend your advertising dollar	effectiveness of your advertising program	how to plan a sales campaign	how to analyze consumer buying
Maintenance	how to estimate equipment efficiency	the best point at which to replace equipment	when to service equipment	how to reduce corrosion (with technical assistance)
Shipping	how to eliminate backlogs	how to eliminate tie-ups at loading terminals	the best way to operate a pipeline	where to locate production for lowest shipping costs
Communications	how to design the most efficient communications network	how to minimize paper work	how to speed up interplant communications	the best way to code data
Inventory	how to maintain most profitable balance with production	how to dispose of an inventory most profitably	what lowest inventory will satisfy production needs	when and what to order
Research	how to design experiments	how to plan research	how best to apply findings	how to evaluate new techniques
Administration	how much work should be done in how much time	when to work overtime	how to assign work to minimize labor cost	how best to word contracts
Warehousing	how to design plants for minimum materials handling	how large the warehouses should be	how to supply warehouse network at minimum cost	how to schedule flow for least handling

jective analysis on which he can base his decisions, Operations Research does away with most guesswork. *But at no time does it serve as a substitute for policy-making management.*

Nor can Operations Research substitute for services such as product research, market research, statistics, accounting, production control, inventory control. As an adjunct of these services, it calls on them for information in arriving at general principles equally applicable to all of them.

The basic assumption of the operations researcher is that all effects have corresponding causes. He uses intuition, common sense, judgment, and technical skill to reduce data to their workable components. From these he tries to understand the operation.

He then formulates a tentative theory to explain the observed pattern of action and sets up an experimental model. This is generally a mathematical representation—a group of equations that describes the operation under study.

Building the model is the researcher's principal and probably most difficult job. With it, he is able to predict outcomes of alternate courses of action and to predict the best course to the company's objective.

The mathematical models are generally of two types:

1. Deterministic (or exact) model. It is used in operations where variables are controlled, chance plays a small part, and the effect of any given action can be closely gaged.

2. Stochastic (or probabilistic) model. It recognizes uncertainty, is used where not all the variables are controlled, and the effect of any given action varies in a random manner.

These broad categories, in actual application, are refined and separated into several distinct theories. Researchers have found that linear programming, queing theory, Monte Carlo method, statistics, symbolic logic, and game theory can describe mathematically a real situation and serve to predict outcomes of different courses of action applied to the situation.

• **Linear Programming**—This is a mathematical method that evaluates a number of alternative factors to find the best relationship (McG-H Digest, May, p21).

For example, a specialties company may have orders for 25 different products and five reactors available for limited periods. Each reactor could be used for all the orders, but batch time for the same product varies from one reactor to another. A linear-programming model will show which orders should be scheduled for what periods in each reactor to get the least total reactor time.

Other uses: to establish best production scheduling, find most profitable product mixes, allocate sales-promotion dollars for best sales return, divide work for lowest labor cost, route a trucking fleet through a network of warehouses.

A comparatively new tool, linear programming has advanced further than other branches of mathematical programming. But its ap-

plication is limited. Relationships must be linear and not subject to random fluctuations. Input-output relationships must be known.

• **Queing Theory**—A division of the theory of probability, the queing theory is used to change situations where valuable time is lost through waiting. It can aid any operation in which units arrive at some point in an irregular manner and are passed on to some other point at a different rate.

• **Monte Carlo Method**—Based on the law of probability, the Monte Carlo method works through random sampling. To simulate a real situation, it involves many simple calculations.

Many problems solved by this method can be worked out by more rigorous analytical methods. But doing so would involve solving complex and difficult equations. Possible applications include solid-state physics problems, planning sales campaigns, production scheduling, estimating equipment efficiency, designing sales and production experiments.

• **Statistics**—The most commonly used Operations Research tool, it touches on almost all problems. It's the means of screening the mass of data with which researchers work.

Statistics has long served management in many jobs—keeping records, setting standards, checking quality. Among new uses are statistical design of experiments and econometrics. (Econometrics are mathematical models of economic situations that show the effect of changing factors).

• **Symbolic Logic**—This is a sort of generalized mathematics in which symbols and rules of logic are substituted for words. It's reserved for complex situations whose true meaning is hidden by inconsistent or illogical expressions. An obvious use is the interpretation of involved contracts.

• **Game Theory**—One of the newer techniques, game theory deals in strategy of competitive play. It shows you how to play the game so that no matter what move an opponent makes, you end up with the lowest possible loss.

So far, game theory has been applied mostly in solving military problems. It is a valuable tool in analyzing certain situations, mapping out possible moves, pointing out the most favorable action. Although it will have to be further developed before it finds wide industrial use, many operations researchers feel it will prove invaluable in outguessing competition.

These are a few of the mathematical tools being used at many companies to solve management problems. Among companies already using Operations Research or planning to do so are Du Pont, U. S. Rubber, Atlantic Refining, Celanese, Armour, Minnesota Mining & Manufacturing, Schenley Industries. It is likely that within 10 years every large business and industrial firm in the U. S. will be using Operations Research in one form or other.

Many companies employ consulting firms; others have set up their own Operations Research teams. In establishing such a department, a large company may already have capable personnel within its organization. When a new team is set up, top management should recognize that it needs an adequate familiarization period and that it must be free and have enough authority to work with and across all levels of organization. Otherwise, the Operations Research program will be ineffective.

The Operations Research group, in turn, must be objective in its work and respect the responsibilities of other departments. It must keep management informed of its progress because it is management, after all, that must assess its results.

Results may be measured by actual savings, net profit, or the like. But, more often than not, justification for Operations Research will be found in the intangible—in the unprofitable moves and wrong decisions never made.

Guide to Operations Research

Econometrics: A mathematical model of an economic situation.

Game Theory: A method of selecting strategy that will minimize a player's loss.

Law of Probability: If enough samples are taken at random, composite effect will closely approximate the over-all pattern.

Linear Programming: The theory by which activities—independently variable and subject to certain restrictions—related to each other in linear fashion are arranged to obtain maximum results.

Monte Carlo Method: A method of using random sampling to simulate a real situation so that test conditions can be dry-run or complicated analytic equations by-passed.

Model, Mathematical: A group of equations that describes an actual operation mathematically and can be manipulated to show what effects a change will have.

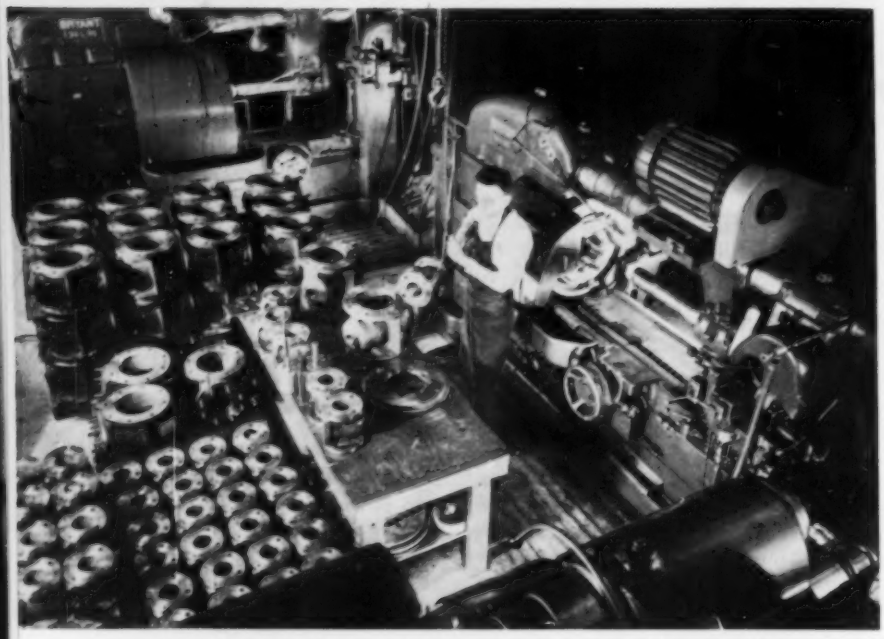
Model, Deterministic: A mathematical model in which chance is only a minor factor and can be controlled by manipulation.

Model, Stochastic: A mathematical model in which chance is a major factor.

Queing Theory: A body of theorems governing the formation of waiting lines.

Statistics: The technique of screening a mass of data to turn it into useful information.

Symbolic Logic: The body of rules and theorems governing the manipulation of mathematical symbols substituted for relating words (such as: if, no, not, or, and) in a statement. It uncovers true meanings and helps clear up involved situations.



Lower cost is the pay-off for grouping these three grinders

Ten Cost-Cutters . . .

. . . have been packaged into a money-saving program by a firm that has learned how to put planning and organization into its economy drive

DIGESTED from Factory Management and Maintenance, June, p84 —Edward Valves, Inc. (East Chicago, Ind.) has found that economy of operation should be just as much a part of year-to-year planning as the basic operation itself. They save money by planning to save money—just as they plan the production of valves. All ten points of Edward's program may not apply to your particular operation, but most of them should.

1. Communications: Edward sends three bulletins to its workforce. A one-page memo called "Building Better Valves," issued monthly from the president's office, discusses economic problems, new products, costs and is posted on bulletin boards throughout the plant. A multi-page bulletin, mailed monthly to supervisors and executives, discusses operating problems and costs. A weekly bulletin, sent to each member of the sales force, discusses competition.

Savings are intangible, but real. Morale and cooperation are kept high. This part of the program accounts for an estimated 2% of annual cost reduction.

2. Supervisory Training: Courses are begun each fall; run through the winter. Cost accounting, tooling, production methods are covered.

Savings here account for an estimated 4% of total cost reduction.

3. New Ideas: Rank-and-file employees are encouraged to submit ideas for cash awards. Executives and supervisors are encouraged to read a wide range of periodical literature covering the valve business; they are also sent to numerous industrial conferences and "clinics." Many key men take outside technical courses.

Savings come from around 150 cost-cutting ideas that are submitted, on an average, each year. These account for an estimated 8% of total annual cost cuts.

4. Program of Objectives: Each year, department heads prepare programs that outline cost-reduction and related objectives for the 12 months ahead. Progress is measured each quarter, with full reports at the end of year. Typical objectives—on a departmental level: (1) improve inventory turnover; (2) streamline production control procedures; (3) keep labor above 120% of standard; (4) budget minimum indirect labor; (5) eliminate non-profit items from product lines; (6) improve at least one machine layout every month.

Savings were high in 1954 for this medium-size concern. Inventories were cut enough to save over $40,000 in carrying charges. Machine layouts were greatly improved by regrouping, creating "batteries" of machines to be handled by fewer workers. (See grinder layout, left). Eleven types of valves were redesigned with good cost results. About 10% of the saving total occurs in this phase.

5. Operating Manual: A book outlining procedures, developed first in 1929, has been updated every year since. A huge volume of reference material has been developed. The company solves many current problems by studying procedures developed in past years. The result: "preventive maintenance" against costly mistakes. Savings amount to about 3% of over-all cost reduction.

6. Special Committees: Major objective is guidance of the work force and effective operation for reduced costs. Ten committees, 4 to 8 men each, direct special functions in the organization—all the way from, say, quality control to fire prevention and safety. Groups are in action all year. All employees are made cost and efficiency conscious.

Savings resulting from greater efficiency, due to committee activity, account for an estimated 15% of total cost reduction.

7. Purchase Projects: Company requires an approved requisition for every purchase of material. Purchases that are repeated often must be recorded on permanent records that show month-to-month purchasing practice. Each purchasing agent is required to be always at work on at least one long-term purchasing project.

Each buyer looks constantly for more efficient and economical suppliers, for chances to buy in

cheaper lot quantities, and for changes in specifications.

Savings amount to about 10% of total annual cost reductions.

8. Labor-Cost Controls: Payroll analysis and management are a year-round project. About 20 payroll reports are prepared each year. Idea is to coordinate all aspects of payroll expenditure—average hourly cost, number of workers, department cost, and others. Close control is achieved by making close comparisons between jobs and departments. Its purpose is job performance improvement among all workers—covering both indirect and direct labor.

Savings are great. In 1954 the company cut labor costs 15%. This is 3% of total cost cuts.

9. Engineering and Quality Control: Much engineering activity is aimed at lower costs for product material and labor. The idea is to concentrate on chemical analyses, amounts of raw materials required, standardization of parts, design techniques, changes in material specifications (as from a casting to a forging, or vice versa)—all with an eye to possible lower costs. Also sought are opportunities to adjust operations to achieve lower cost processing.

Savings account for 20% of total. For example, quality control with respect to castings alone saved $23,000 in 1954.

10. Methods Improvement: Company regards this as the biggest single factor in its cost-reduction drive. The program ranges from major improvements—complete retooling of machines—to minor changes.

Machining techniques, multiple machining operations, advanced tool-engineering methods, improved motion studies are all included. In 1954, the company made ten major methods improvements, plus several minor ones. Savings account for 25% of total annual cost reduction.

Overall Result? Just how much has Edward Valves managed to save? In 1954, for example, it cut costs 7% in one major segment of its business. Direct labor productivity increased 6.5%; rework ratio was down 26%. Total economies enabled the company to offset rising labor and material costs.

End Turnover Troubles

The time to prevent quick turnover of employees is before you hire them. Here are some techniques that should help stabilize your work force

DIGESTED from Personnel, May, p514—American Airlines decided recently that its hire-and-quit figures were far too high. An analysis showed that the highest percentage of turnover was among employees with little seniority.

Too many people were taking jobs with American and staying barely long enough to get acquainted—or get their wings! Only 13.4% of all employees had under one year of service, but this group accounted for almost 50% of turnover. Many quit with less than 3 months' service.

American, aware of excessive recruitment, hiring and training expenses—plus production losses and dislocation of personnel and services—decided on a simple six-point program. The company was especially anxious about the high quit rate among *new* employees who quit before the company had realized any return on its training investment.

The program—adopted on top of such standard elements as capable supervision, good working conditions, favorable promotion policy, and proper compensation plans—is showing good results. An outline of the program follows:

1. Make the initial employment contact pleasant. The employment-office experience can make a forceful and lasting impression on the new person. The receptionist's welcome, the appearance of the office, the complexity of the application form, time consumed, the interviewer's attitude—all are important.

2. Give honest recruiting information. Don't let the interviewer give the new person too rosy a picture of the company, the job, the benefits. The prospect should be informed about the disadvantages of shift rotation, transportation troubles, and the like. Possible disadvantages, as well as advantages, must be made clear.

3. Use careful selection as a control measure. Idea is to eliminate unstable applicants at the time of hiring. American's research revealed that there were five significant differences between stable workers (who remained on the payroll) and those who quit readily. Each of the factors was weighed according to relative importance:

Unstable Persons	Stable Persons	Point Score
Unmarried males Married or divorced females	Married males Single females	3
Under age 20	Age 20 and over	2
Unwilling to transfer	Willing to transfer	2
No friend in company	Has friend in company	2
Rent or live with parents	Home owner	1
	Maximum Score.....	10

The higher the ten-point score, the greater the percentage of employees still on American's payroll. Example: of those with a zero score, only 28% were still with the company; of those who scored ten points, 87% were still on the payroll. Accordingly, American decided that—in addition to meeting all usual employment standards—an applicant must score at least 4 points, thus eliminating the least stable applicants.

4. Indoctrinate new employees. The new person wants to "belong," to feel himself a part of the company. A good induction program can be the answer. Make sure the man is well suited to the job and the people around him.

5. Establish realistic hiring rates. Only floaters and marginal workers will accept jobs at rates below those prevailing in the industry. Job evaluation and wage analysis provide the answer. In the wage-analysis process, rates paid by competitors, especially hiring rates, should be compared.

6. Improve personnel planning. Employment office cannot select fully qualified persons unless given adequate notice. It takes time to screen. A pool of reserve workers should be established, if practical. And the personnel department should be informed well in advance of any departmental expansion.

DIGEST Changes Name to . . .

MANAGEMENT DIGEST

With the September 1955 issue, McGraw-Hill Digest changes its name to

McGraw-Hill International
MANAGEMENT DIGEST

In announcing the change, I want to tell you that this new name better indicates, I believe, the service that the magazine can perform for you.

Each of us, no matter what title he holds, needs to know more about how to manage better. We must manage business operations, we must manage others, we must manage ourselves. And there is available much information that will help you do a better job of running your plant or your business . . . **if you can find it.** That's what MANAGEMENT DIGEST will continue to do for you . . . seek out and publish the best technical, industrial, and commercial information and present it to you each month.

There will be no change in the basic policy of the magazine . . . our editors will continue to study a host of outstanding business and industrial magazines, and select those articles for digesting that we feel will be of greatest help to you. We will continue to look for new magazines to add to our list.

Why are we making this change? Because careful analysis of **your** readership of articles in past issues, and our personal interviews with readers, revealed that management articles interest you more than any other kind.

Along with changing our name, we are changing the cover of the magazine. So your next issue will come to you in a new dress, as well as with a new name.

In announcing this change, McGraw-Hill pledges to you that we will continue our efforts to make McGraw-Hill International MANAGEMENT DIGEST the outstanding magazine for management men throughout the free world.

Charles S. Mill

Charles S. Mill
Publisher

Jet Starch Cooker

Digested from Paper Industry, May, p138—A continuous jet cooker, made by A. E. Staley Mfg. Co., provides accurate and controlled cooking of starch slurry to any desired degree of starch properties. This is an important accomplishment as different grades of paper may require different starch properties for maximum productivity and quality.

The cooker forms the starch slurry into a uniformly flowing film, which is then brought into contact with a high-velocity steam jet. Temperature control is accurate so that starch properties can be controlled closely.

Plastic Electrical Tapes

Digested from Electrical Construction and Maintenance, Apr, p171—Only a few years ago when an electrican made the simplest kind of electrical splice, he had to be equipped with both a roll of rubber tape and friction tape; the first for insulation, the second to stick the joint together.

Now vinyl plastic tapes are taking the place of both. Among their characteristics:

- They are pressure-sensitive (self sticking) and eliminate the need for friction tape.
- Their thinness substantially reduces bulk.
- Elongation of well over 100% allows a snug, well-formed cover over irregular surfaces, thus eliminating air and moisture traps.
- Dielectric strength of approximately 1,700 volts per 0.001-in. thickness provides necessary insulation.
- They are resistant to oils, moisture, acids, alkalis.

New Techniques Reduce Masonry-House Costs

Digested from American Builder, June, p100 — Money-saving construction techniques gave builder Gaines a sales advantage and buyers more house for their money in a Miami, Fla., housing project. Each house has 3 bedrooms and contains 1,146 sq. ft. Concrete blocks make up outside walls. Wood trusses support the roof. These are the techniques the builder employed:

1. **Better advance planning.** Subcontractors have an opportunity to submit their cost-cutting ideas.
2. **Special equipment.** Two men with a fork truck do what seven would do and can handle loads of from 100 to 10,000 lbs.
3. **Pallet handling and delivery** of materials is the key to lower costs in moving concrete masonry.
4. **Lightweight trusses** eliminated interior load partitions and foundations.
5. **Shop fabrication** of plumbing and wiring assemblies.
6. **Special re-usable forms** and form clamps.
7. **Mass building** of interior wall partitions.
8. **Training** of special work teams for special operations such as form building.
9. **Multi-use** of equipment (trucks unload at night).

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Increase Profits by Cutting Costs!

Hitachi, Ltd. which has specialized in almost every type of rolling-stock including **electric locomotives** for these several decades, maintains also an established reputation as a leading manufacturer of all equipment necessary for railway electrification, such as **water wheel generators, transformers, mercury arc rectifiers, rotary converters, switchgears, power cables, trolley wires** and **rail bonds.**

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Tokyo Japan

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Load-Bearing Panels Speed Church Assembly

Digested from Architectural Record, June, p218—Load-bearing aluminum wall panels, tapered steel roof trusses, and aluminum batten-seam roofing were assembled by a five-man crew in 3 days to complete the 128x40-ft. shell of a church in Bethel Borough, Pa. An expanding parish needed an edifice that could be built quickly and economically and that could be dismantled and moved to another site if necessary.

A load-bearing wall system has panels consisting of a ribbed aluminum facing, glass-fiber insulation, and an interior facing sheet of galvanized steel. The 4x8-ft. panels carry roof and wind loads and are preassembled into units 12 ft. long. Aluminum load-carrying members are integral in each panel. Some panels contain aluminum window and door frames.

Wall units were bolted to a concrete curb above the floor slab. Tapered steel roof beams were bolted to the panel heads. Rigid insulation and aluminum batten-seam roofing cover a steel deck applied over the beams.

Schell, Deeter and Stott, Architects, developed the system jointly with Aluminum Structures, Inc., (Pittsburgh).

High-Mining Fork Lift

Digested from Engineering & Mining Journal, June, p106—Fork-lift trucks are making themselves useful in many areas outside materials handling. Another innovation in this trend finds a fork truck deep in a lead mine in Sweden.

Boliden Mining Co. mounts a 2-ton drilling jumbo on a Hyster model 150 fork truck for drilling 30-ft. high benches. Highly mobile, the truck can readily raise and lower the jumbo to allow accurate spotting of the drilling pattern.

To gain access to the roof and rib, an extension platform was devised for similar mounting. This attachment makes the truck useful in miscellaneous roof jobs.

Experimental Carrier Rides on Bags

Digested from Engineering News-Record, June 2, p66—A new experimental U. S. Army cargo and personnel carrier has been developed by the Four Wheel Drive Auto Co. It is designed to travel over any type of terrain on eight giant air pillows. The carrier utilizes the new, low-pressure pneumatic tire bags developed by the Goodyear Tire & Rubber Co. There are eight of these tire bags, each 3½ ft. in dia., 5 ft. long and inflated to 3 to 5 lb. per sq. in. Extremely pliable, the balloons absorb travel shock by conforming to surface irregularities.

Press-Molded Tanks In Mass Production

Digested from Modern Plastic, June, p100—A new approach to both the economics and the engineering of reinforced-plastics tanks for storage and dispensing of distilled water, acid solutions, fuel oil, and other problem liquid is proving successful at Copolymer Corp. (Los Angeles).

The company has designed and engineered a set of standard components that can be press-molded in steel dies direct from glass mat. The components can be assembled to form standard-size tanks on the job at a great saving in cost.

Tanks are built up from two basic components: domed head, or end sections, and half circles, both flanged. The half circles are permanently joined at the ends to form circular tank segments, the joining being accomplished at the flanges by resin sealing plus the use of stainless-steel rivets.

The tank segments are bolted together circumferentially with neoprene gaskets between the flanges. End pieces are similarly applied when the desired length has been obtained.

Underground Corrosion

Recent study by U.S. National Bureau of Standards has revealed that some bolt materials used underground can be protected against corrosion by making them cathodic to the structures they fasten. Otherwise, they fail more rapidly as electric currents flow through the soil from certain areas (anodes) to areas of less negative potential (cathodes) with resulting loss of metal from the anodes. If a bolt becomes anodic, it fails more rapidly than the surrounding metal.

The tests showed that making low-alloy bolts cathodic reduced weight losses from 53 to 93%. Adding relatively small amounts of alloys, particularly 1½ to 2% of nickel, retarded corrosion also. Tests on high-alloy cast iron and nickel-copper alloy, both of which are cathodic to cast iron, indicated negligible corrosion.

NEW IDEAS TELL HOW TO . . .

. . . mix flexible flooring material

Digested from Business Week, May 28, p78—Take some liquid rubber, mix it with a special cement powder, and you have a bouncy, bendable flooring material that sticks to concrete, metal, or glass. It is prepared like regular concrete—standard masonry equipment is used both to mix it and apply it. Caution: start with a clean surface. Dust or oil will prevent bonding to the base flooring material.

Naugatuck Chemical Div. of U. S. Rubber Co. produces the special mix, called Laticrete, says that it flexes without cracking under heavy loads, cuts down shock and noise, is waterproof, and has a non-skid quality. It resists alkalies and mild acids. Average cost is 55¢ per sq. ft. including installation. This is higher than cost of ordinary asphalt, less than cost of vinyl or rubber tile.

. . . batch a concrete mixer

Digested from Electronics, June, p20—Installation of a punch card-controlled batching system at a new plant of the Cleveland Builder's Supply Co., boosted efficiency and accuracy of concrete mixing.

Each of over a thousand cards carries punched information giving the bin location and weight of each ingredient. Initiating the weighing cycle, the required amounts of ingredients are dumped into auxiliary bins. When all the bins contain the required weights, the operator can route their contents into the mixer. The system was designed by Fairbanks, Morse & Co.

. . . diagnose automobile-engine ills

Digested from National Petroleum News, June, p168—An electronic engine analyzer will spot 65 automobile-engine ailments. Developed by Socony Mobile Oil Co. (formerly Socony-Vacuum), it is being manufacturerd and sold by Allen B. DuMont Laboratories, Inc. (Clifton, N. J.)

The tester, connected to the ignition system with two lead wires, gives simultaneous pictures of the behavior of each cylinder on an oscilloscope screen. It can identify burned distributor points and check ignition timing and operation of intake and exhaust valves. It can also diagnose preignition faults and troubles caused by noise and vibration or by combustion knock.

FLOWERS are vended by coin machine with glass front in Hamburg, Germany.

COIN MACHINE SELLS cartons of six doughnuts through store's front window. Idea is on trial in New York and Pittsburgh.

AUTOMAT SELLING in Stockholm offers wide variety of merchandise from outside-the-store units available at all hours of the day or night.

ABOARD TRAIN unit serves hot sandwiches heated by electronics.

Coin-in-the-Slot Selling Grows

The ultimate in self service, always "open," moves a rising volume of goods. Are any of your products suitable for automatic selling?

DIGESTED from Modern Packaging, May, p71—Coin-in-the-slot selling, growing rapidly, now moves $1½-billion worth of packaged products—a sizable share of retail sales in the U. S. In several European countries, notably Sweden, Denmark, Britain and Germany, large vending machines supplement regular retail stores. They sell food products, drugs and related items.

A major trend toward vending a wide variety of products is shaping up. The industry is moving into food-and-drink service on an increasing scale. Thus, food producers and other manufacturers, as well as producers of packaging materials, will profit from a study of some of the packaging problems of the automatic-merchandising field. Much remains to be done in the way of combined product and package development, if "push-button selling" is to reach the full potential it promises.

At the present time, many types of vending machines provide only limited display of the merchandise. But automatic merchandising is an extension of the self-service principle. Effective display of the package and product should do much to stimulate impulse sales. With this idea in mind, many machine manufacturers are considering the development of "picture-window" equipment that will make more merchandise visible.

An interesting type of unit called "Elmer," built by T. S. Skillman Co. (London, England), displays the merchandise available directly beside the machine in a well-lighted glass case. Below each item are price and identification number. The customer inserts the proper coins and pushes the button corresponding to the number beneath the desired article.

Vending machines often may be an ideal way to sample a new product and thus build acceptance in regular channels. Rapid strides have been made in the automatic merchandising of hot coffee, hot chocolate, even hot soups. The greatly increased use of such equipment in offices, plants, and terminals

has resulted in greater consumption of instant-type coffee concentrates and has been an important factor in building and maintaining consumer acceptance for this type of product.

Chef-Way, Inc. (Kansas City, Mo.) equipment offers selective vending of coffee, hot chocolate, soups, and tea at the turn of a dial. Concentrates in the form of specially-prepared round pellets provide a measured portion with closely controlled taste and quality. When the customer drops his coin and makes his selection, a pellet of the proper type is automatically ground up so it will reconstitute quickly when combined with hot water.

In the soft-drink field, a major trend affecting packaging appears to be the swing toward cup-vended drinks as opposed to those in which the beverage is sold directly in the bottle. Multiflavor equipment dispenses as many as six or eight types of drinks and offers a choice of carbonated or non-carbonated beverages. Automatic vending of fluid milk—both plain and chocolate flavored—has also made progress.

One of the biggest future potentials for the automatic-merchandising field lies in mechanized catering—the dispensing of a complete line of food and drink in industrial plants and other locations where a large number of patrons must be served on a 24-hr. schedule.

Budd Mfg. Co.'s automatic-feeding installation at its Detroit plant provides complete meal service for 7,000 production workers. Ten batteries of food and drink machines are strategically located throughout the plant for worker convenience. Machines sell hot and cold beverages, sandwiches, pastries, soups, salads, milk, and ice cream.

Before automatic catering really can expand, many new packaging problems must be met and solved. A greater variety of foods must be made available, packaged in such a manner as to permit easy automatic dispensing and serving at the drop of a coin.

The ready-cooked complete frozen dinners, now sold from frozen-food cabinets in retail outlets, look promising. These products may point the way to others that would meet the requirements of automatic catering.

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ENGINEERS
BANKERS
AGRICULTURISTS

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ANTARA **O-M**—For materials up to 16" wide (41 cm), at speeds up to 30' (9.14m) per minute. This desk-top model has all the features of larger ANTARA machines, except width of copy.

Streamliner 400—Reproduces prints on sheets or continuous roll stock up to 42" wide (107 cm) at speeds to 24' (7.3m) per minute. Synchronized printing and developing. Convenient front delivery of copies.

Printmaster 810—Unmatched for large-volume production. Handles materials up to 42" wide (107 cm) at speeds to 40' (12.2m) per minute. Printing and developing are synchronized. Front or rear delivery of prints. Larger model Printmaster takes originals up to 54" (137cm) wide.

Bambino—No larger than a typewriter, this amazing machine produces up to 200 copies an hour on 9" sheets (23cm) or from 8 to 10' (2.5 to 3m) per minute on continuous roll. Low in cost, extremely economical to run.

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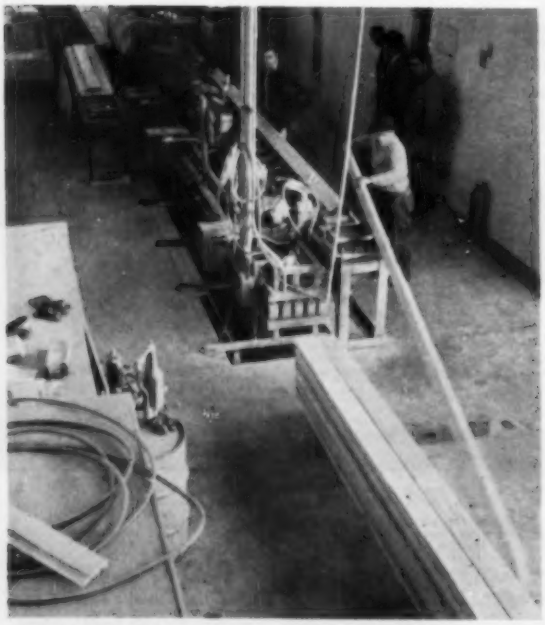
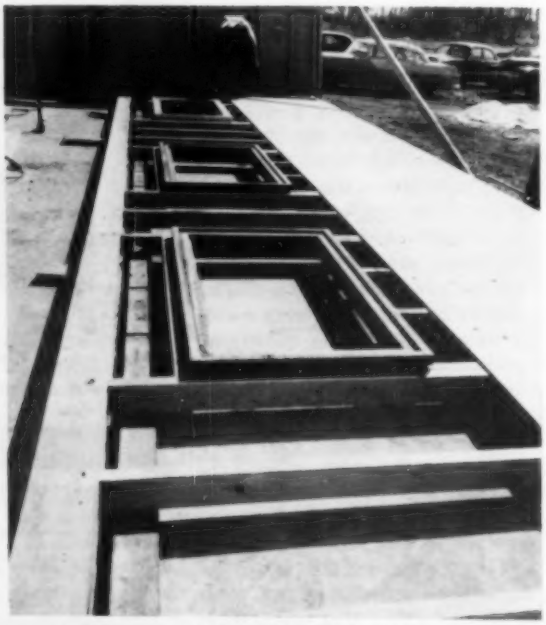
- With the demand for low- and medium-cost housing increasing every year, homes are bought today by model and price—like automobiles.
- To meet the demand, and rising costs, builders are relying on innovations in design, building techniques, and materials. This means →



1 PRECUTTING the lumber to be used in building materially reduces time and labor at the construction site. The necessary pieces for each unit are sent to the field.



2 WALLS are assembled on foundation slab, using precut sections. Windows and door frames are built in, the outside is waterproofed, and plywood siding is put on.

3 COMPLETE WALL is swung up and out to make room for the next one. When all walls are ready, the workmen push them upright and fasten them in place.

4 ROOF TRUSSES, also made from precut lumber, are swung into place. Workers build a truss in 5 min. This house needs 15. Roof and walls take 2½ days.

Mass-Production Housing

DIGESTED from Business Week, Apr 30, p62—The record housing boom in the U. S. has meant more than just more homes. It has meant a new kind of home and a new approach to building.

The majority of low- and medium-cost houses in the U. S. today are bought in much the same way that a car is bought. Design is determined by the builder rather than the buyer. And the same design in a given developed area may be repeated hundreds or even thousands of times. The prospective buyer visits several such developments, weighs cost against preference, and then decides.

The main factor has been cost in the trend away from individually built homes. Using 1913 as a base (100), building costs stood at 184.96 in 1926 and today have risen to 461.34. Coupled with this has been an unprecedented demand for new homes. Housing starts for 1955 have been estimated as high as 1.4-million.

To keep up with this demand and at the same time build decent houses that people can afford, builders have had to switch to mass-production methods. Last year some 78% of American homes were built in this way.

One phenomenon of the building boom is the prefabricator. If he does what is called total prefabrication, he runs a factory that turns out house sections just as Detroit turns out automobile bodies. His product is a complete, ready-to-assemble housing package.

The more usual procedure does not rely on total prefabrication, but does rely heavily on such short cuts as pre-cut materials.

Keynote of the entire building process is efficiency: how to get the most living space into the least cubic footage. The rambling organization of earlier homes is giving way to carefully designed functional schemes. Rooms are placed together with an eye to their relation.

In line with this, builders and engineers have evolved a new basic approach to building, typified by the wall panel.

A wall panel is basically a whole section of wall that comes ready to be put in place. It can come completely finished both inside and out, with doors and windows already in. Like the parts of a car body, it is a standard unit for a standard model.

Some houses are built by the "post and beam" method—a series of heavy posts with beams laid across their tops support the roof. This leaves more open space in the walls because the posts can be farther apart than ordinary studs. It also means the wall panels do not have to carry any load and can be of lighter, less expensive construction.

As walls become space dividers,

not load supporters, they can be made of different materials—plywood, fiberboard, or glass—depending on the climate. Various other possibilities will emerge as building codes and prejudices catch up with technology.

Plumbing, wiring, and heating, which are usually put into walls by hand on the site of the job, may be in for revolutionary handling. Some builders today are watching carefully the development of a pre-assembled utility wall incorporating plumbing, wiring and heating units. This unit could be placed between a kitchen and bath or between two baths, hooked up to primary outlets and turned on.

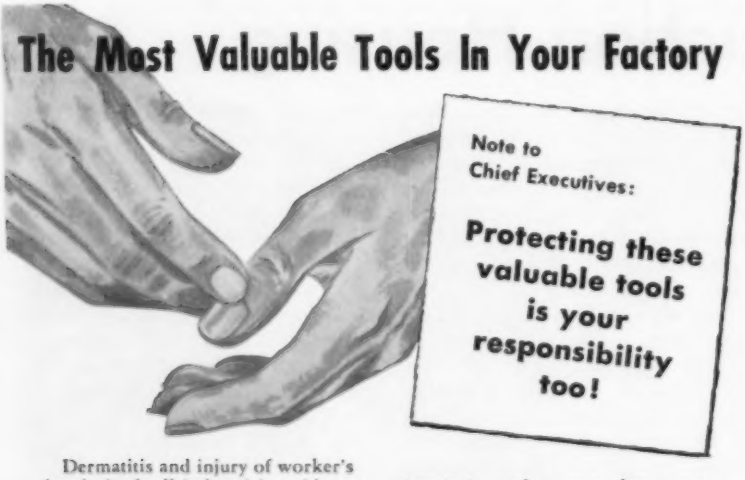
Still another development that opens up the inside of a house for more economical treatment is the roof truss. A truss is a thin triangle of wood designed to rest only on the outer walls and to support the weight of the roof without any help from inside walls. This building technique alone is doing much to cut interior costs and save on expensive labor time.

It is pretty well agreed today that home building is a mass-production business. But when you come to the question of how to put the mass product together, the disagreements are loud and vigorous.

The prefabricators, on one hand, believe that much of the house should be put together in a factory before any of the pieces and materials leave for the site. This, they say, makes it possible to take full advantage of production-line techniques, holds down labor costs, and permits faster factory time and assembly time.

The on-site speculative builder (who builds first and sells later) agrees that the building should be preplanned to the last detail. But he prefers to work with precut materials for assembly on the spot. This, he feels, gives him the advantage of a less unwieldy package of materials to transport with less shipping problems. And he doesn't have to worry about plant maintenance and plant labor.

The Most Valuable Tools In Your Factory



Dermatitis and injury of worker's hands lead *all* industrial accidents in frequency, lost work-hours and expense. This is preventable waste that may be costing your company far more than you suppose.

Only a liquid-tight glove gives positive physical protection from chemicals and germs that cause hand dermatitis. 32 PIONEER styles, weights, sizes and colors plus performance data for each style of glove are shown in the Stanzoil Catalog. We'll be glad to mail you a copy promptly.

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Maintenance Cost

Dow Chemical's work-measurement method is a proven short cut to low-cost maintenance

DIGESTED from Factory Management and Maintenance, June, p116 —Estimators at Dow Chemical Co. (Midland, Mich.) have found that the real crux of an effective maintenance estimate program lies in accurate labor figures.

Over-all cost saving depends on exact answers to questions like: How long should it take a man to do the job? Or part of it? Any adjustment for weather, working height, exposure? Use hand tools? Or power tools?

Dow's work-measurement method does not employ "time-study" in the usual sense to establish so-called elemental times or basic data. Instead, the program is based on historical records—dating back to 1928—modified by factors that "normalize performance" to allow for special conditions affecting worker effort and fatigue.

The Dow operation (with 990 men employed in the maintenance-shop organization) is founded on the belief that (1) work measurement based on elemental time studies is not practical except for highly repetitive operations; (2) savings realized from a program using elemental time values will not make up for the extra cost of application and administration unless pay incentives are included—and Dow has no incentive plan; (3) obsolescence and technological improvements change maintenance operations so constantly that standard data based on elemental values soon become unreliable.

Standard data for substantial segments of jobs—that's the basis of Dow work measurement. Man-hours are used as a unit. Data are mostly in chart form. Standard data are based on experience—with a selection of only those jobs that represent standard conditions and use of proper methods and tools. Goal of the Dow program: a manual of up-to-date data for each and every maintenance operation.

Pry-Out Action Pads Help Lift Bucket

Digested from Construction Methods & Equipment, June, p126—Complete bucket breakout at ground level is built into two new Payloaders announced by Frank G. Hough Co. (Libertyville, Ill.). Maximum bucket loads are brought out with a minimum of power, even under tough conditions by means of "pry-out action."

Two broad steel pads on the bottom of the sturdy bucket-supporting arms rest directly on the ground and the bucket is tipped forward and backward hydraulically. The breakout pads on the ground become a fulcrum for powerful leverage. Opposing forces brought into play when cutting out a load of material are transferred directly into the ground, instead of to the axles, wheels, and hydraulic system.

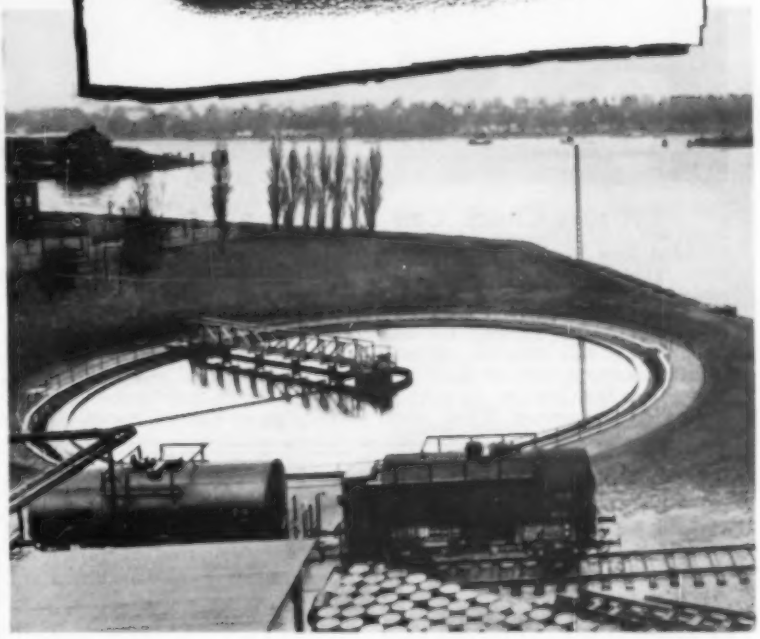
In a demonstration, a Payloader easily handled heavy, sticky clay. To get the clay out of the bucket cleanly, the operator rapped the bucket smartly against steel stops when dumping, to jar loose any sticking lumps.

Machine Hydraulics

Most textbooks on hydraulics treat the subject from the civil-engineer's viewpoint, leaving the information available on machine hydraulics sparse and widely dispersed. Hydraulic Operation and Control of Machines, written by Ian McNeill and published by Thames and Hudson (London), corrects this situation. While it is devoted to a practical treatment of the subject, it does not neglect the basic theoretical considerations.

Range of topics is wide—pumps, motors, valves, circuits, power devices, fluids, piping, forging presses, extrusion machines, drawing presses, machine tools, molding and diecasting machines, and the application of hydraulics in a variety of industries.

Oil Refinery Waste Treatment in Germany



In Germany too, stream pollution by industrial wastes causes serious problems. A large refinery in Hamburg solved the problem with the installation above. Showing a marked similarity to current practice in the United States, the plant employs a 110′ dia. Dorr Clarifier equipped with a skimming arm as the main treatment unit.

Feed to the unit is 6600 GPM of refining waste, and an effluent is produced containing less than 20 ppm of oil, well under the limits required by the authorities. Equipment was supplied by our Associated Company in Germany, Dorr-Oliver G.m.b.H.

If you have a problem involving the separation of finely divided solids in suspension . . . or ion-exchange . . . or the use of fluidizing techniques, there's a good chance that Dorr-Oliver and its world-wide organization can help you.

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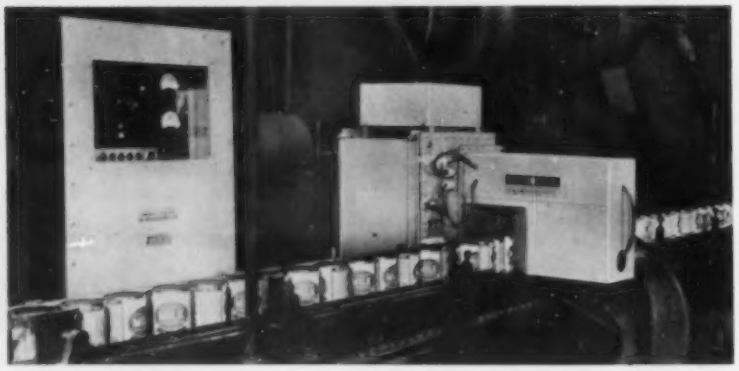

X-rays Check Can Fill Fast and Cheaply

Digested from Chemical Engineering, May, p244—Hytafill level checker, made by General Electric Co., assures accurate filling on container line at the rate of 15 cans per sec. Previous top limit was less than six. Hytafill rejects containers with fill level varying by more than 1/32 in. It operates by projecting narrow X-ray beam across conveyor at a height adjusted to desired fill level. When incorrect fill alters X-ray beam, a crystal detector triggers a reject device. Products checked include virtually any liquid or freely flowing solid—detergents, beverages, milk, juices, oil, cleaning fluids, paint, chemicals, insecticides, and liquid waxes.

Low-cost Roofing — Acceptance grows for poured-in-place gypsum roof decks with Fiberglas acoustical form board for buildings such as schools. Complete poured deck above purlins may cost no more than a suspended acoustical ceiling alone.—Ceramic Industry, May, p43

Titanium Welding—Solar Aircraft Co., in fusion welding of titanium aircraft parts, bathes work in inert gas. Gas-tight zippered plastic tent, fastened to welding table, surrounds work during welding. Operator wears rubber gloves sealed to the vinyl bag.—Welding Engineer, May, p5

Emergency Telephones—A portable, self-contained telephone unit for emergency and field uses has been developed by Wheeler Insulated Wire Co. (Waterbury, Conn.). The compact, hand-carry unit requires no batteries or connection to outside power sources. The user's voice generates the power required for transmission.—Electrical World, May 30, p158

Arches Built Last—Arch ties and floor system for Jacksonville, Fla., three-rib arch bridge were built first and supported by falsework. Derrick then erected arch ribs and hangers. When the ribs were completed, they were connected to the ties, hangars remaining detached from the floor system. Jacks, attached to the hangers, pulled the floor system up so that it could be attached to the hangars.—Engineering News-Record, June 2, p33.

Removable Truck Tracks—Are your trucks and mobile units operating in underdeveloped areas—on deep-mud roads or sandy stretches? Your bogging-down problems may be solved by attaching removable truck tracks. They're light, slip-on caterpillars designed to fit most tires and single or tandem axles. The manufacturer (P&G Supply Co., Portland, Ore.) says they give up to 500% greater flotation. They come in standard width of 15 in. or heavy-duty width of 18 in.—Electrical West, May, p36

Office on Wheels—Field-office trailers, to be towed by car or truck, are now available for on-the-job office space and semi-permanent field operations. All essential facilities—desks, files, phones, drafting tables—have been cleverly designed into small spaces by International Trailer Co. (Baltimore). Standard units are 28 to 35 ft. long.—Electrical Construction & Maintenance, June, p140

Cutting Paper Made Easy—Photo Materials Co. (Chicago) has come up with a new paper-cutter designed to speed up operations in the office. The all-metal, desk-size cutter has a polished cutting surface scored in half-inch squares to assure proper positioning of material. A holding clamp descends with the cutting blade, holding the stack of paper in rigid position and serving as a blade guard.—American Business, May, p45

Chases Mosquitos—Bite Ban is a pill. Chew it and you'll be so unattractive to mosquitoes that they may alight but not bite. It's made by Kentrol Corp. of stavesacre, long known as a parasiticide.—Chemical Week, May 14, p66

Checking Blade Profile — Société Genévoise type AP-15 blade projector creates a luminous band by suitably arranged light sources around the part to be inspected. Profile is then projected upon a screen, the work appearing black against a bright halo.—Metalworking Production, May 20, p900

Univac, The Second—By means of a magnetic core made up of thousands of tiny magnetic "beads," Remington Rand's new computer can "retain" 24,000 characters and can execute 8,000 orders per minute. Remington's new High Speed Printer takes Univac's answers off a tape and prints them at 600 lines per minute—on any prepared form.—Factory Management & Maintenance, June, p140

A New Look in U. S. Trucking

Digested from Fleet Owner, May, p60 —U. S. truck operators, in an effort to provide faster and cheaper service for their customers, are using the facilities of the railroads. Tractors are shipped on so-called "piggy-back" trains and are picked up by tractors at their destination. Cooperation between the two transportation systems will prove profitable to both the truckers and railroads. Trains above, travel between New York and Chicago.

Space-saver Cell—New chlorine-caustic cells designed by Vittorio de Nora of Italy require minimum floor space, low mercury inventory (40% less than present mercury cells), and high sodium level. For 60,000-amp. capacity, bank of cells measures only 50 in. long, 3 ft. wide, and 3 ft. high.—Chemical Engineering, June, p103

Welding-cable Overheating—This trouble can be quickly remedied. Use the right cable size; most shops use No. 00 cables. Make sure that joints are good as poor joints set up too much electrical resistance. Choose proper joint bolts and cable terminals. Use good ground clamps with large-enough clamping screws.—Welding Engineer, June, p44

Bent Forgings — Wyman-Gordon Co. forges intricate aircraft wing spars with ears flat, then bends them vertically to critical dimensions. Ears are bent to compound angle by s ecial tooling on a 1,500-ton press. Methods saves material, reduces machining. — American Machinist, June 6, p178

Petrochemical Giant — Imperial Chemical Industries' plant at Welton, England, is the biggest single project in British chemical industry. It will manufacture ethylene and propylene from liquid oil fractions rather than from natural gas as in the U.S.—Petroleum Processing, May, p703

Fleet Stores Dairy Products—Borden Co.'s 91 refrigerated delivery trucks store dairy products overnight. Trucks are loaded at end of day's run and plugged into an electrical outlet that keeps truck's refrigeration unit running. Trucks are ready to run first thing in the morning. About 7,000 sq. ft. of refrigerated space is saved. —Fleet Owner, June, p44

Plastic Wings—Aircraft and guided missiles may fly on plastic wings as a result of a new fabricating technique devised by Cornell University Aeronautical Laboratory. Technique involves forming a plastic core inside a mold, then applying a resin-impregnated glass-fabric skin.—Product Engineering, June, p5

Computer Rates Fuel—How does an automotive fuel really perform? One way to find out is through a road test. But you can pack only so much equipment into an automobile. Du Pont set up a compact computer in the back seat of a Cadillac. It measures 12 operating variables, horsepower, and miles per gallon.—Control Engineering, June p58

Transistor Auto Radio—Jointly developed by Philco Corp. and Chrysler Corp., an all-transistor automobile radio will be optional equipment on 1956 Chrysler and Imperial cars.—Electronics, June, p7

Plastic-coated Paper—Uses are growing for polyethylene-coated paper, which is an excellent barrier to most liquids. Packaged products include syrup, sauces, pickels, dried milk, dried soup, tobacco, cosmetics, silver polish, sugar, butter.—Paper Industry, May, p155

Anti-Smog Muffler

Digested from Petroluem Processing, May, p607 & 668—Los Angeles Air Pollution Foundation estimates that, of daily total of 2,600 tons of combustion products entering the city's atmosphere, 1,000 tons come from automobile exhausts. So Southwest Research Institute (San Antonio, Tex.) is testing Houdry catalytic muffler on six makes of automobiles. The hope: that it will furnish a method to remove air pollutants by burning most of hydrocarbons to harmless carbon dioxide and water.

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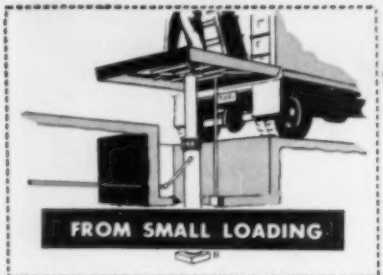
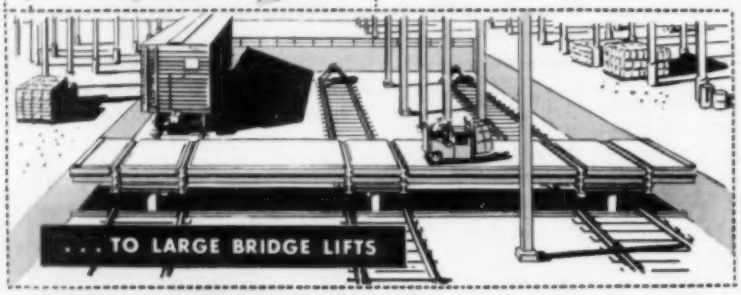


TO LOAD TRUCKS
(*Left*) Where no loading platforms are available, Globe OiLIFTS quickly raise heavy loads to truck bed level. In "down" position, platforms are flush with floor, permitting free cross travel of men and vehicles.

TO LOAD MACHINES
(*Left*) Globe OiLIFTS position bulky materials to speed production of machines and processes.

TO CROSS A DEPRESSED AREA
(*Below*) Synchronized hydraulic cylinders raise giant Globe bridge lifts from railroad track level to loading dock height, permitting two-lane traffic of heavily loaded fork trucks.



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Careful Sales Training Cuts Costly Turnover

Digested from Electrical Wholesaling, Apr, p60—High turnover in the sales staff of any company is an expensive proposition and one that reduces efficiency.

Faced with this problem, Providence Electric Co. decided to institute a sales training program.

First step is recruiting good men. To improve the caliber of men employed, Providence put more emphasis on screening and interviewing. Applicants should have some experience in the field, and they must provide three references that are carefully checked.

Second, instead of sending men out on the road on a "sink or swim" basis, new men are carefully coached on the company's methods, accounting, and the use of catalogs.

Third, initial experience is gained in the company's warehouse and in selling across the counter under the eye of more experienced personnel.

Finally, when the man starts on the road, he is given all the help he needs with customer contacts and special problems. Frequent sales meetings give him a chance to brush up on new developments and discuss his problems.

Styrene Production

Digested from Petroleum Processing, May, p707—Laboratory experiments at Dow Chemical Co. show important advantages for continuous catalytic hydrochlorination of styrene in a packed absorption column over batch processing:

- Considerable savings in anhydrous hydrochloric acid.
- Increases up to six-fold in hydrochlorination rates.
- Better temperature control.

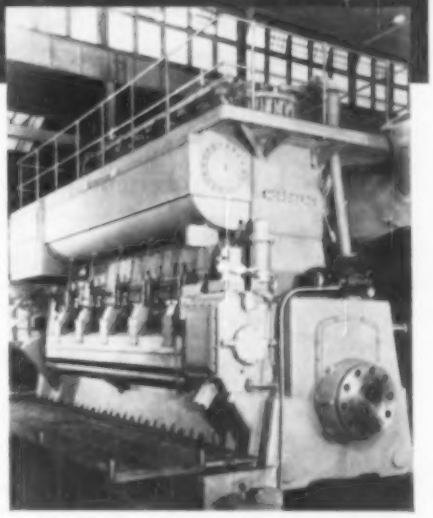
Two types of catalysts were tested. One was inorganic and was deposited on the surface of Sil-O-Cel, which was then used as packing for the absorption column. The other was organic. It was mixed in the styrene reaction feed before entering the column, which was packed with either helices or berl saddles.

NORDBERG DIESELS supply 20,000 Dependable Horsepower for 4 New Venezuelan Cargo Ships

Here is the new twin-screw C.A.V.N. Motorship "*Sucre*", sister ship of the "*Merida*", "*Yaracuy*" and the "*Araguy*", each powered by two 2100 shp Nordberg two-cycle Marine Diesel engines for a designed service speed of approximately 15 knots. In addition, each ship depends on two Nordberg 400 hp, 275 kw Diesel engine auxiliary generator sets . . . *a total of 5000 NORDBERG Horsepower per vessel.*

All four ships are some 372 ft. in length, with a displacement of 4800 dwt, and a capacity of over 300,000 cu. ft. Trim and sleek, two of these well designed motorships were built by N. V. WERF GUSTO at Schiedam, and the others by the DE NOORD and YUYCK shipyards, also in Holland . . . all for delivery to COMPANIA VENEZOLANA DE NAVAGACION of Caracas, Venezuela.

When selecting main propulsion and auxiliary marine power, be sure to specify Nordberg . . . Diesel power at its best. Write for further information, outlining your power requirements.



Shown on the erection floor prior to disassembly and shipping to I.H.C. Holland is one of the eight 2100 shp Nordberg two-cycle, five cylinder, 21" bore Diesel propulsion engines for powering the four C.A.V.N. Motorships.

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Wherever the job may be, the 'Jeep' Truck gets there with men and equipment. With the extra traction of its 4-wheel drive, it goes through sand, mud, snow and roadless fields . . . up steep hills and other places ordinary vehicles can't go. On good roads it shifts easily to 2-wheel drive for conventional driving. Ask your 'Jeep' dealer for a demonstration today.

4-WHEEL DRIVE 'Jeep'® TRUCK

A member of the 'Jeep' family . . . world's largest-selling 4-wheel-drive vehicles

Willys-Overland Export Corp., Toledo 1, Ohio, U.S.A.

Powder-Metal Cutters Promise Milling Economy

Digested from American Machinist, June 6, p128—Powder metal for milling-cutter bodies and single-point toolholders offers definite advantages. Disposable milling cutters (sintered) with thin carbide blades, for example, may cost less than regrinding and provide longer tool life and faster cutting.

Powder-metal bodies are cheap, despite high mold costs. The carbide blades are gripped in vise-like jaws of wedges inserted in slots molded in the body. The whole cutter should cost less than regrinding the same size tool of any other design. Not only are blades expendable, but the body as well is discarded when cutting edges are dulled.

Another advantage is reduction in vibration. Hardened wedges and bodies with mechanical holding set up a vibration in the carbide blade during a cut. With the powder-metal body, vibration is absent; even the cut sounds different and chips are silver white at customary surface speeds as the powdered metal sets up a dampening action.

Cutting is faster than with conventional cutters because more teeth can be set in a given diameter. A 3-in. cutter may have 16, or more if desired, compared with the usual eight.

Chemical Developments

Digested from Chemical Week, May 14—

▶ **Permanent resistance** for wool to moths, fungi, bacteria, and alkalis may come from chemicals now in the laboratory. Researchers at University of Heidelberg (Germany) have found several that help; they are continuing their investigation.—p52

▶ **Polyester jacket** for magnet wire offers advantages of heat and solvent resistance, high dielectric strength, flexibility, and craze resistance. Suppliers are General Electric Co., Schenectady Varnish Co., and Westinghouse Electric Corp.—p62

Ultrasonics Spots Flaws, Prevent Breakdowns

Digested from Factory Management and Maintenance, May, p126—An ultrasonic sound-wave device finds hidden flaws in heavy machine parts for Republic Steel Corp. (Warren, Ohio) long before serious breakdowns can occur.

With the Reflectoscope, made by Sperry Products, Inc. (Danbury, Conn.), Republic eliminates causes of repeated breakdowns by redesign of parts. For example: blooming-mill spindle pins were frequent casualities. With the Reflectoscope, Republic located the source of fractures. Then it redesigned the pin to eliminate the weakness.

Spare parts are kept ready for breakdowns. The device can pinpoint cracks or flaws before they become dangerous. Republic replaced a hot-strip-mill drive shaft 14 months after a slight crack was detected. When failure was imminent, a spare shaft was ready. Diesel locomotive axles are periodically checked for flaws. Damaged axles can be replaced more easily in a shop than out on the tracks.

Automatic Boring Mill

Digested from Metalworking Production, May 20, p910—Automatic electronic control of a Webster & Bennett vertical boring mill at Jaguar Car's Ltd.'s Coventry Works (England) permits one operator to rough-profile-turn flywheels as well as operate two Potter & Johnson automatics on the first roughing operation.

The automatic control enables any shape of templet to be followed with no hand control. The tracer head is attached to an extension of the turret slide. Deflection of the stylus moving tangentially to the templet edge governs speed and direction of rotation of two motors that drive the horizontal and vertical traverse motions.

Each motor is fed from a separate generator. Amplified signals from the tracer head act through excitation circuits of the generators to vary feed motors and thus to control the path of the tool.

Motivation Research in Industrial Selling

Digested from Sales Management, May 20, p81—A panel of experts in the fields of advertising, marketing, and selling agrees that motivation research can be a powerful tool in industrial selling. To date, this specialized type of research has been employed primarily in testing consumer attitudes (McG-H Digest, June, p13).

"So-called rational engineers," said Dr. Ernest Dicter, president of the Institute for Motivational Research, "can be just as emotional and irrational as a housewife. They get emotional about material, see beauty in a cement oil-well casing, but they use technical language to describe what to them represents beauty in a product.

Through motivation research, the experts agreed, the marketer will gain insight into the industrial-man's reasons for buying. It will be possible for the alert company to develop new appeals, readjust its sales approaches, and profit from what it learns.

4-wheel drive does another job better

HAULING

Here's a rugged, all-purpose vehicle that does a job for you 365 days a year—the 4-wheel drive Universal 'Jeep'. It carries loads up to a half-ton and tows trailers many times its own weight. It travels in conventional 2-wheel drive on paved roads, but shifts easily into 4-wheel drive when extra traction is needed, on or off the road. Equipped with power take-off, it furnishes mobile power for many types of farm, industrial and public service equipment. Ask your 'Jeep' dealer for an on-the-job demonstration.

4-WHEEL-DRIVE UNIVERSAL 'Jeep'®

WILLYS-OVERLAND EXPORT CORP., TOLEDO 1, OHIO, U.S.A.

World's most useful vehicles

Soviet Industry Faces Productivity Problems

Digested from The Economist, May 28, p776—The Soviet government is taking a long, critical look at Russian industry, which, in certain respects, the government feels is falling behind Western techniques. In terms of the current 5-year plan (1951-1955), the manpower objective has already been exceeded, but the productivity target will not be reached.

One reason for the lag in productivity may well lie in the nature of the newcomers to the labor force. Its rapid growth was made possible only by the greater employment of women—who are less productive—and above all by the turning of peasants into industrial workers. These peasants find it difficult to adapt themselves to industrial life and more difficult to master the latest techniques.

Productivity, however, is rising, and there is plenty of scope for progress in bringing the more backward plants up to the technical level of the model establishments and the inefficient newcomers up to the standard and skill of the old industrial workers. This Bulganin and Krushchev hope to achieve through technical education and the concentration of investment in engineering industries.

Train Follows Rail

Digested from Control Engineering, May, p80—Spinning plant and weaving plant of Kanegafuchi Spinning Co., Ltd., Japan, are separated by ½ mile. Route is outdoors and not straight, so conveyor system is too expensive. A battery-powered electric train is the answer for hauling between plants.

Locomotive is three-wheeled, the single front wheel being pivoted for steering. An electromagnet attracted to an iron strip laid under the paved road is linked to the steering wheel and acts as a pilot. The train follows the iron strip from plant to plant. Automatic switches stop the locomotive.

Paper from Bagasse

Digested from Paper Industry, Apr, p52—Research at the University of Florida on making paper from bagasse (sugar-cane waste) revealed that: (1) pulps with 95% alpha cellulose can be obtained in 5-min. cooking time; (2) pulps show high burst, tensile and folding strengths but low tear strength.

Bagasse was passed three times through a rotapulper to remove pith, then cooked with a low liquor concentration to get a high pentosan content. Yields were high—in the 60 to 63% range. Hand sheets were prepared for testing.

Bagasse pulps proved definitely superior to pine kraft pulp in burst, tensile and double folds. In tensile strength, bagasse was 20% stronger; in burst, 10%.

Bagasse tearing strength was less than half that of pine kraft, but more detailed study may result in pulps of somewhat higher strength. Even now, bagasse makes an acceptable kraft but it is not recommended for newsprint.

How Ross Carriers cut costs *the world over!*

GERMANY It's more efficient to move steel on rubber than on tracks, as proved by the Huttenwerk Oberhausen A G, Ruhrgebiet. Two of these 45,000-lb. capacity Carriers handle slabs between blooming mill and plate mill. Formerly the firm used their own rail cars, which involved considerable switching and numerous handlings. With a Carrier, one man handles the entire job from pick-up to destination.

SOUTH AFRICA

Here's another one-man handling system—a Ross Carrier in action at K & L Timbers, Ltd., Johannesburg. This machine picks up 10-ton unit packages of timber and transports them anywhere — kiln, saw-mill, storage, even to the job-site. Fast, simple and extremely flexible.

JAPAN At the Hikari Plant of Yawata Iron and Steel Works, management is sold on the unique advantage of the Ross Carrier—a one-man operation. It loads itself in 5 seconds, travels at normal road speed, unloads itself in 3 seconds. The Carrier's speed and flexibility permits low-cost outdoor storage at considerable distance from the actual manufacturing plant.

Free Booklet →

Send for this 16-page illustrated booklet which contains twenty-one case histories of Carrier applications in various industries.

Your local Clark-Ross distributor will tell you how the unique, job-proven advantages of the Ross Carrier can be applied to your own operations. Write for the name of your distributor.

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EXPORT DIVISION
CLARK EQUIPMENT COMPANY
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Unique Approach Aids Management Development

Digested from American Machinist, Apr 25, p118—New management-development technique at Jack & Heintz, Inc. (Cleveland) has no formal training program. Instead, it utilizes individual initiative, self reliance, and enthusiam to teach supervisory personnel how to make and carry out sound decisions. Its chief job is to integrate the management structure of the three supervisory levels—line, mid, and top management.

The first assignment was to define line-management objectives. The mid-management group defined twelve major objectives, which were then submitted to top management for approval.

Teams of three or four men from line management were organized, and each one was assigned two or three of the objectives. Their job was to find practical ways by which line management could effectively satisfy the purpose and intent of each objective. By study, discussions, and coordination, methods were developed that were broad enough to have application in any and all departments.

The plan provides an organizational approach to the management job. It assures participation by all supervisory personnel. It pulls all three management levels together and provides a uniform guide for management.

Speeds Engine Test

Digested from Aviation Week, May 23, p68—New engine test stand omits usual whirling club propeller, is virtually noiseless, and incorporates a near 100% power recovery feature. Developed by Clayton Mfg. Co. for Trans World Airlines, the stand will help heat buildings with recovered heat.

The dynamometer includes a fan for cooling the engine and can absorb up to 4,000 hp. The fan draws air through an annular air duct that surrounds the dynamometer. Excess air spillage is provided to control engine temperatures.

A quick-coupling feature needs only 10-min. time to connect an engine to the test stand. Former test stands took two men 3 hr.

Quick-Dries Macaroni with Infrared Heat

Digested from Food Engineering, June, p58—Drying is an expensive time-consuming operation in macaroni factories. But one U. S. macaroni manufacturer has introduced a sweeping change in his drying operation—slashing the time from about 18 hr. to 12 min.

Extruded elbow macaroni is blown by 140°F. air to a series of cascading vibrating screens. Directly above each screen is a battery of infrared lamps that toast-dry the macaroni in 12 min.

Screens vibrate intermittently rather than continuously. As the macaroni travels over the screens, it alternately vibrates for a ½-min. period and remains stationary for 1 min. Vibrating tumbles the product for uniform drying and toasting, while the 1-min. rest period allows the macaroni to soak up the infrared heat.

From the last screen, the toast-dried macaroni drops onto a slow-moving cooling belt that carries it directly to the carton-filling machines.

Ceramicasting Process Gives Close Tolerances

Digested from Aviation Week, June 13, p58—Castings with tolerances and finish comparable to those obtained in the lost-wax and frozen-mercury processes are produced by an economical and fast method being developed by the Lebanon Steel Foundry.

Any type of pattern can be used in the Ceramicast process, thus eliminating expensive dies. All ferrous metals can be cast. Casting size is practically unlimited.

Molds are made as follows:

1. **Silimanite binder** and catalyst, ethyl orthosilicate, are mixed to form molding material.
2. **Molding material** is poured on the pattern. It sets in 3 to 4 min.
3. **Mold is stripped** and set aflame to burn off alcohol formed as a result of catalysis in the molding material.
4. **Mold is fired** at 1,000°F. for 30 min. per inch of thickness to burn out organics. The result is a completely gas-free ceramic mold.

At 200-tons per hour, aggregate for damming the Damodar River moves by S-A Conveyor from the secondary crusher (right foreground) to a battery of S-A screens over storage bins.

A conveyor belt under these storage bins reclaims aggregate and moves it to the concrete batching plant as needed. Underground S-A conveyor is 720-feet long and handles 300-tons per hour.

S-A Conveyors Help Dam India's "River of Sorrow"

● Flowing through the heart of India's fuel-metal producing center, the tranquil Damodar River becomes a raging torrent in the monsoon season. Property damage, and human misery follow, making the Damodar truly a "River of Sorrow."

The Damodar Valley Corporation, with a series of huge dams, has brought the river under control and converted the rampaging waters to the more useful job of producing hydro-electric power and irrigation.

Aggregate for the Maithon Dam, number three in the project, was supplied to the concrete batching plant by an S-A conveying system which included belt conveyors, screens, feeders and bin gates. The Stephens-Adamson equipment was furnished through Eastern Equipment & Sales Ltd. of Calcutta, associates of Atkins, Kroll & Co. located in San Francisco.

With the completion of the Maithon Dam in late 1954, the entire conveyor system was dismantled and relocated at the Panchet Hill Damsite. Again at work, it is another example of an S-A system "engineered for the job."

Stephens-Adamson equipment and engineering can team up to solve your conveying problems. Write for a survey.

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Shorter time in transit, less handling and closer supervision assure air shippers that their products or purchases will not be subjected to the dangers of pilferage, for centuries the plague of world traders. Speed, quicker turnover of capital, and savings on insurance, warehousing, and packing costs also make it good business to ship by air!

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Transducer Tube Changes Signals to Letters

Digested from Electronics, May, p182—High-speed printing, required for the output of various devices such as computers, may be possible with a new electron-image tube. Developed by Radio Corp. of America, the tube simulates typesetting. It selects letters and figures one at a time from a lantern-slide font projected from outside the tube onto a sensitive layer at the rear of the tube. This photoemissive layer emits a stream of electrons in the pattern of the projected letters. Selection of letters in the required order is accomplished with a tiny aperture at the neck of the tube, permitting only one character at a time to pass through. A magnetic deflection coil shifts the stream to choose the desired letter. Another set of coils focusses and deflects the character to its proper place on the screen.

Fermentation Process Gives New Chemicals

Digested from Chemical Engineering, June, p116—In only 2 months, Chas. Pfizer & Co. (Brooklyn) has added five new products to its sales line: itaconic acid, dimethyl and dibutyl itaconates, and two more esters of citric acid.

More important than any one product is their method of manufacture—fermentation. Typical is Pfizer's submerged process for making itaconic acid. Cheap molasses, rather than expensive sugar, is the raw material. The molasses can be high-test cane, beet, or blackstrap.

Molasses mixed with nutrients is charged into a fermentor along with the mold. Sterile air is blown in at the bottom. When desired itaconic concentration is reached, the broth is filtered in a rotary filter and concentrated in a multiple-effect evaporator.

Crude crystals are recovered by chilling and centrifuging. Crystals, water, steam, and carbon are mixed and passed through a plate-and-frame filter press. Itaconic is recrystallized, centrifuged, and dried.

Possible uses for itaconic acid include resins and plastics, synthetic fibers, elastomers, plasticizers, lubricating-oil additives. Many of these uses can now be commercialized as the acid will be in ample supply at a stable price.

Enameled Chalkboards

Digested from Ceramic Industry, June, p54—World-wide, the potential market for chalkboards is huge. In the U. S., for example, the school market alone is estimated at 3.6-million sq. ft. by 1958.

Most chalkboards are made of composition board, available at fairly low costs. Other chalkboards have been made of porcelain-enameled steel, but prices have been high. To fill the cost gap, General Ceramics Corp. has developed chalkboards of porcelain-enameled aluminized steel.

The new board has high scratch resistance and the desired degree of matteness, plus excellent writing, erasing and wearing properties. Light shades of low gloss can be produced, making them equally suitable for crayon or as projector screens. Scratch resistance is high. The board can be cut, drilled, sawed, and nailed during assembly.

Mr. Transport Chief—

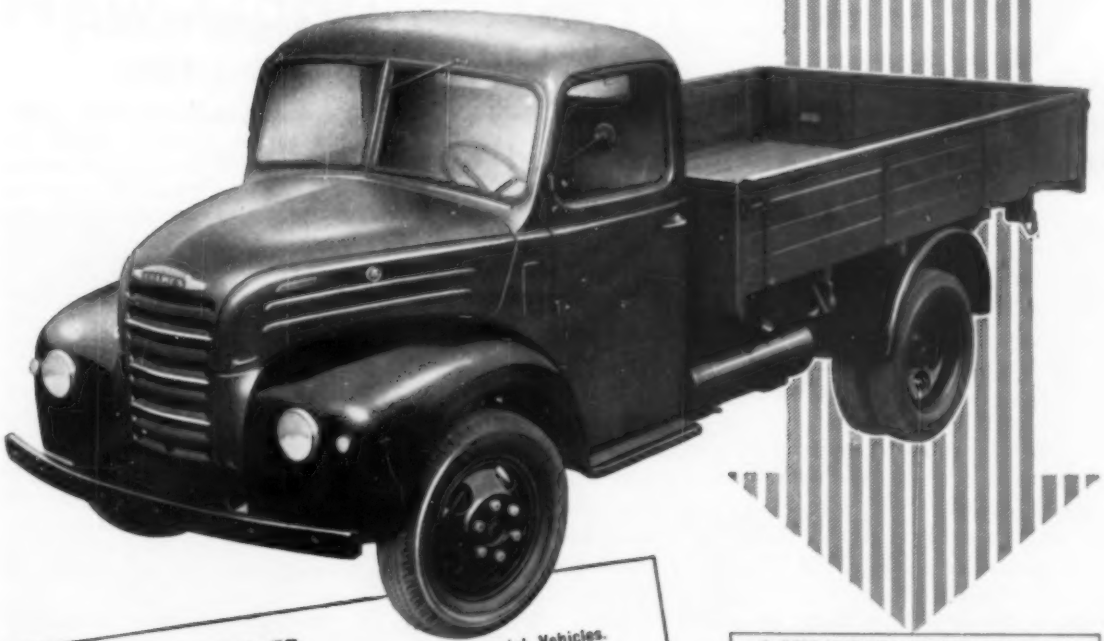
HERE'S A SOUND BUSINESS INVESTMENT!

SPECIFICALLY DESIGNED to increase profits on 1½ to 3 ton haulage operation, the remarkable THAMES truck with 4-cylinder O.H.V. 'Cost-Cutter' Petrol engine is the efficient, economical answer to your needs:

Check these features against **your** *needs:*

- ✓ **STRONG, RUGGED CHASSIS— DESIGNED FOR MAXIMUM STABILITY**
- ✓ **GIRLING, HYDRAULIC, TWO LEADING-SHOE BRAKES**
- ✓ **HEAVY-DUTY GEAR BOX AND CLUTCH**
- ✓ **SEMI-FORWARD CONTROL**
- ✓ **12-VOLT ELECTRICAL SYSTEM**
- ✓ **GREATEST VALUE AT MINIMUM COST**

See your Ford Dealer for full details.



ASK YOUR DEALER about the full range of famous Thames Commercial Vehicles. The 1½ ton and 2 and 3 ton models fitted with the outstanding **DAGENHAM - BUILT DIESEL ENGINE** or the 'Cost-Cutter' Petrol Engine . . . and the 4 and 5 ton models with choice of the powerful, economical 85 b.h.p. V.8 engine, or the famous P.6 Diesel.

4-CYLINDER 'COST-CUTTER'

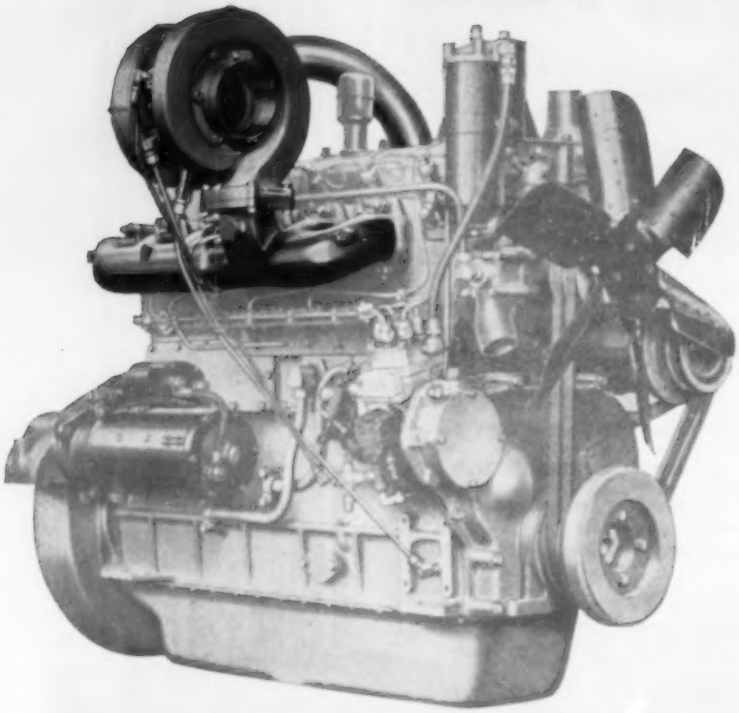
THAMES

1½ to 3 TON MODELS

PRODUCTS OF FORD MOTOR COMPANY LTD · ENGLAND

WAUKESHA

TURBOCHARGED DIESEL



Greater Power at Lower Fuel Cost

Quoting from Waukesha Bulletin 1617:

"The Waukesha Supercharged Engine, Model 135-DKBS, is a compact, powerful, heavy duty, six cylinder, four cycle, full Diesel engine, of 426 cu. in. displacement . . . burns all high speed Diesel fuels having cetane values of 45 or above . . . offers lively acceleration, clean burning, prompt starting, tremendous reserve of power and great over-all economy.

"The exhaust turbocharger system of supercharging affords a great increase in horsepower with a minimum of parasite load. Even without an intercooler the maximum power available from the Model 135-DKB Diesel Engine is increased **from 146 hp to 185 hp at 2800 rpm.**"

Bulletin 1617 contains much more pertinent information. Write for it and for bulletins describing other Superduty, Subercharged Waukesha Diesel and Carburetor Engines in horse power ratings of 10 to 1130.

Export Department

WAUKESHA MOTOR CO.

WAUKESHA, WIS. U. S. A.

Banks Are Increasing Promotion Programs

Digested from Banking, June, p45—Competition in banking, as in other fields, is making public relations, promotion, and advertising more important than they have been in the past.

Among the recent ideas used by U. S. banks: First National Bank in St. Louis has attracted considerable attention with a window display based on chess. A game was set up on a large board. The black king was in "check" subject to capture by the white queen. Black's best move was to advance his pawn to an illuminated square labeled with the name of the bank. An accompanying sign read, "Your best move is to First National Bank in St. Louis."

Another bank, the Hartford (Conn.) National Bank and Trust Co., sponsored a very successful contest to name a pedestrian passageway behind the bank. Some 75,000 people competed for the first prize, a $1,000 savings account.

Automatic Devices Stop Fires Faster

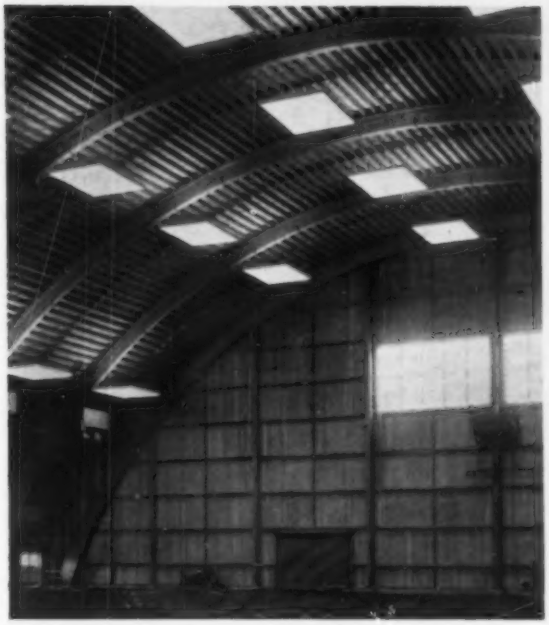
Digested from Power, June, p122—The earlier a fire is caught, the better chance there is of putting it out. Today, there are a number of automatic devices that give early warning of danger.

Photoconductive-cell detectors operate on the principle of modulated radiation by flame. Cell picks up the varying radiation and flicker emitted by the flame and sends a pulsating signal to the control panel, which actuates the fire-warning system.

An electric-eye smoke detector can be placed to monitor an air-sampling pipe or air duct. An alarm sounds if smokes cut down light received from the source or increases reflection to the cell.

Pneumatic systems operate on the rate-of-rise principle. Air in a bulb or tubing expands and creates pressure against a diaphragm that, in turn, makes electric contact or throws a switch. A calibrated vent prevents operation from normal temperature changes, usually under 15° to 20°F. per minute.

The Search for Future



HI-CYCLE LIGHTING has come of age at Union College, Schenectady, N. Y. High-frequency operation of fluorescent lamps provides illumination in field house.—p80

PLASTIC SHIELDING in bank achieves quality illumination of modern office. Shielded luminaries are integral part of decorative design.—p98

New Lighting Techniques

Are you lighting an airport hangar? Or an office? Or a store window? Or even a doll house? Here are four effective lighting plans—for new ideas.—Electrical Construction & Maintenance, June

MONOPOINT ACCENTLITES, for display windows, are bedded in ceiling, may be rotated 358°. Design permits passage of full effective light beams.—p111

FEELING OF SPACIOUSNESS is created in small shoe shop by use of large fluorescent assemblies. Domed Plexiglas diffusers give the effect.—p112

The Search for Future Scientific Talent

Digested from Business Week, May 21, p29—In its constant search for future scientists, industry turned recently to Case Institute of Technology (Cleveland, Ohio). The occasion was the Sixth National Science Fair, where 136 high school students (ages 13 to 18) showed models or detailed drawings of their research into such fields as the principles of electromagnetic balance, the effect of pregnancy on mammary cancer, and a fifth-dimensional analogue of a binomial cube.

Industry representatives were interested, among other things, in finding out at what colleges or universities the junior scientists could be contacted 3 or 4 years from now.

The Fair is sponsored by Science Service, Inc., a nonprofit organization for the dissemination of scientific information. Exhibitors compete first on a regional basis and work their way by a process of elimination up to the annual national exhibit.

Sulfite Improves Roads

Digested from Engineering News-Record, May 5, p41—In Brown County, Wisconsin, a waste by-product of wood pulp production, sulfite liquor, is important to the county road system. In maintenance of unimproved gravel roads, the sulfite binder results in savings from two sources: stabilization of surface so that far less aggregate is lost and decreasing grading costs. Net savings have averaged $200 per mile.

Application methods are the same whether the roadbinder is to provide a stable base for top paving or merely to prevent dust and afford a smoother riding surface. The road surface is smoothed flat with a blade, and windrows of approximately 2 in. are built along the edges to prevent runoff of the applied sulfite liquor.

Roadbinder is flowed on at a rate of 18,000 gal. per mile of 18- to 20-ft. roadway. Then the windrows are worked back into the roadway. For best results the roadbinder must be applied about once a year.

POURING METAL into dish on ice shows one property broadening . . .

Industrial Uses for Glass

Glass is more than transparent. Its corrosion resistance, surface quality, and other properties make it an important engineering material

DIGESTED from Product Engineering, June, p129—Glass is not just one substance. Tens of thousands of glass compositions are on record, and glass properties vary widely. A 96% silica glass (shown above) compares with a soda-lime type window glass about the way platinum compares with cast iron. Types of glasses include:

• **Borosilicate Glasses** — characterized by high thermal endurance, high softening point, high chemical resistance, excellent electrical stability. Typical uses: laboratory ware, electrical insulation, industrial piping.

• **High-Silica Glasses** — characterized by extreme thermal endurance, very high softening point, high chemical resistance, excellent electrical stability. Typical uses: range burner plates, crucibles, thermocouple protecting tubes, induction-furnace linings.

• **Opal Glasses** — characterized by uniform translucence (admitting light but not transparent) and good mechanical strength. Typical uses: lighting ware, food service dishes, refrigerator dishes.

• **Lime Glasses** — characterized by carefully controlled properties and high visual qualities. Typical uses: incandescent and fluorescent lamps, tumblers, tableware, vacuum bottles.

• **Lead Glasses** — characterized by carefully controlled properties and high visual qualities. Typical uses: stems for incandescent lamps, level vials, fuses.

The design engineer can put these glasses and their properties into many industrial jobs. A godet wheel used in rayon machines is a good example. The godet-wheel material must be dimensionally stable so the speed remains constant. It must have good mold-

ability because of the fluted shape. It must permit production of large numbers at low cost, be temperature resistant, and have a smooth surface. The designer picked glass as filling all these requirements.

A variable orifice type flowmeter is another product utilizing a number of glass properties. It consists essentially of a tapered, calibrated glass tube and a metal float.

Glass properties needed in the flowmeter are transparency, surface smoothness as eddy currents at the inner surface would reduce accuracy, moldability, heat resistance, absolute dimensional stability, and chemical resistance.

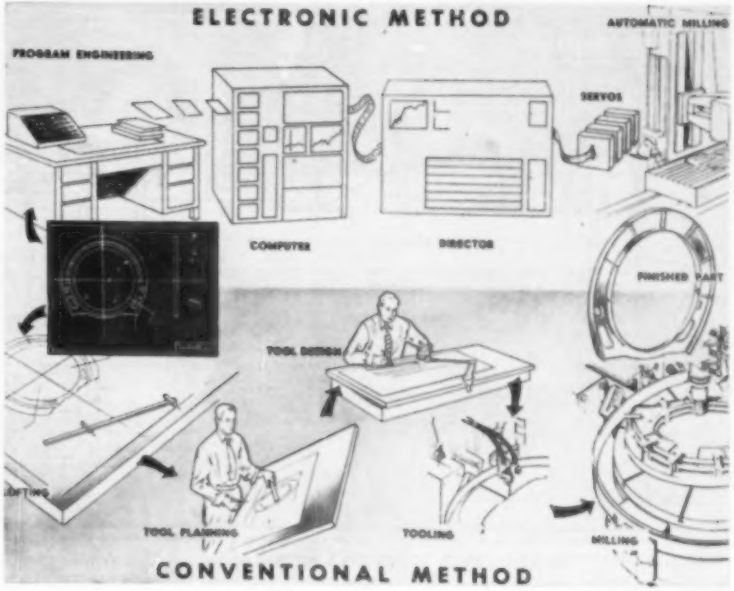
Glass is also serving a variety of industries in the form of pipe from 1 to 6 in. in dia. Its primary requirement in the chemical and food industries is chemical resistance. Surface smoothness aids cleaning. Transparency helps operators check material.

A number of special types of glasses have been developed for particular applications. Metallized glass aids in manufacture of such items as instrument windows, which can be easily soldered into metal frames; encapsulating tubes, which can be readily sealed to make vacuum tight enclosures for electronic components; and glass tubes, metallized to form induction coils.

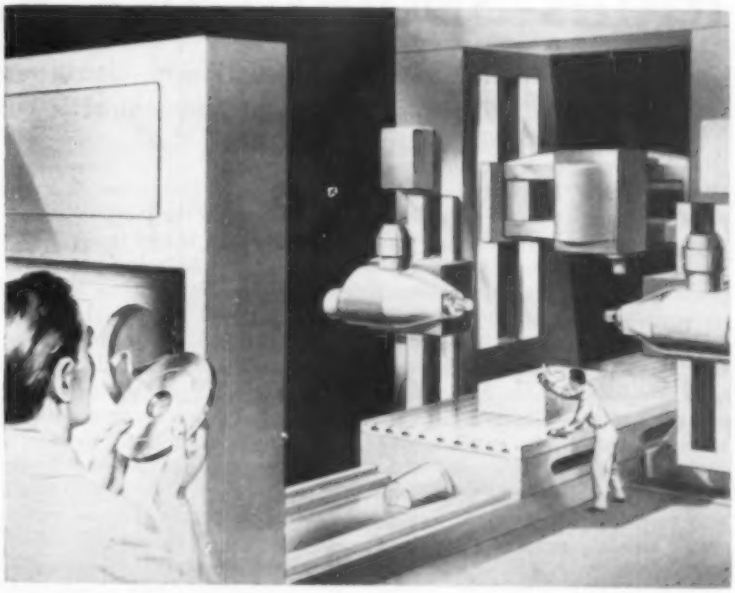
Multiform glass is made by a process similar to powder metallurgy that can form the glass into a number of shapes considered impossible to make by conventional methods. Parts successfully produced by this method include large bubble caps for fractionating columns, tiny diode and transistor cases, pump sealing rings, perforated plates.

Ribbon glass is an unusual form developed recently. It is available as a single piece in 100-ft. and 1,600-ft. rolls, in widths from 0.093 to 1 in. and thicknesses from 0.0013 to 0.0019 in. Its greatest use so far has been in production by Corning Glass Works of fixed capacitors. Made by sealing together alternate layers of glass and foil, they are generally smaller in size than other capacitors of comparable performance and are capable of operation at high temperatures.

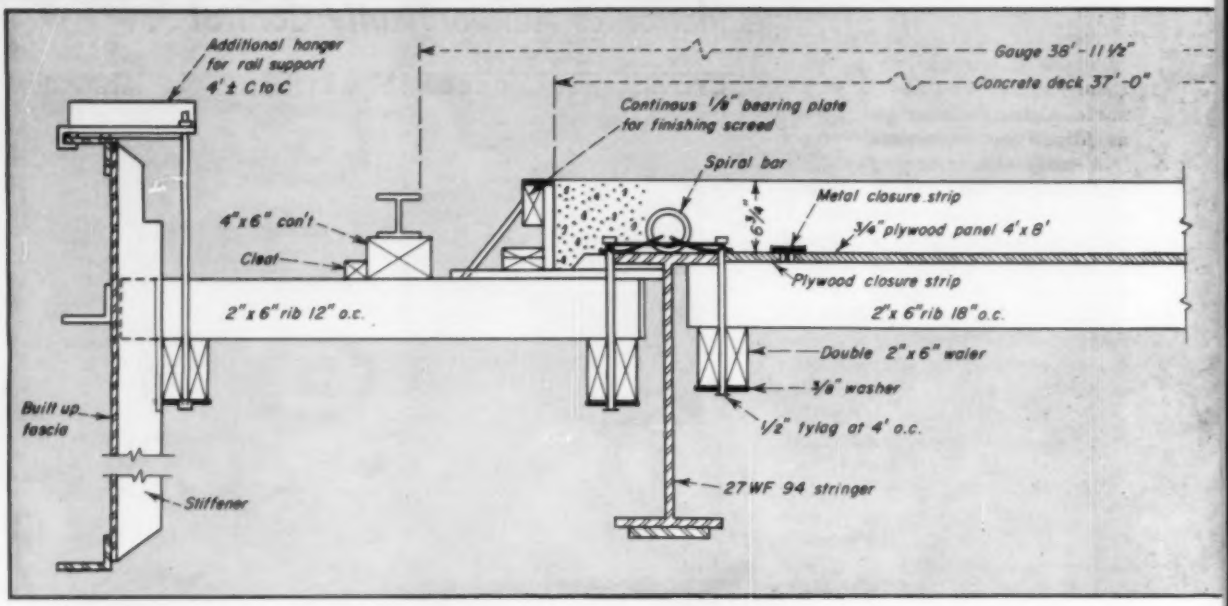
Electronics Automatically Control . . .



. . . 200-Ton Milling Machine



Digested from Control Engineering, June, p15—General Dynamics Corp.'s Convair Div. will design and construct a 200-ton, 18-axis milling machine that may revolutionize aircraft manufacture. The machine will sit on a 20-ft. bed with 10-ft. clearances. It will have two vertical and two horizontal cutting heads—all able to operate at the same time. It will feature a rotary turn-table with variable speed. And it will be able to make 18 different selective motions. The control system for the machine involves the transfer of coded engineering dimensions and formula into coded binary or digital numbers using punched cards or a keyboard. Fed this information, a computer translates it into a punched-tape program. This tape then feeds into an electronic director that either runs the milling machine itself or produces a magnetic tape that will run it. The machine will cut all aircraft metals to any shape within the second-degree curves of today's aircraft.



WOOD FORMS for 6¾-in. thick bridge deck consist of ¾-in. plywood sheets backed by 2x6 ribs spaced 18 in. apart. Ribs are supported by double 2x6 walers suspended from the stringers. To avoid cutting standard 4x8-ft. sheets to fit varying stringer spacing, the additional space is filled with precut closure boards. Gaps are taken care of with

Ideas Speed Deck Paving

A combination of unusual form ideas and mechanized materials handling helped contractor cut paving costs and meet tight schedule

DIGESTED from Construction Methods & Equipment, June, p54—Joint venture contractors paving the six-lane deck of New York's Tappan Zee Bridge are using several unique ideas to complete the 3-mile job. Working from both sides of the Hudson River, contractors Garafaro-West Shore-Euclid are placing a total of 33,000 yd. of concrete in two 37-ft. roadways, a 10-ft. center mall, and two walks.

Work on the trestle section is underway. Main support members of the trestle deck are 50-ft. long steel stringers spaced about 6 ft. apart. Each bay has 15 27-in. stringers and two built-up facia beams. These ideas were put to work by the contractor:

• **New-Type Bulkhead Form**—A longitudinal bulkhead form had to be placed on top of the stringer at the edge of the center mall. These were the requirements: (1) it had to fit between two lines of spiral reinforcements welded to the stringer's top flange, (2) it had to accommodate transverse top and bottom reinforcing steel and a copper spline, (3) it had to serve as a guide for the finishing screed.

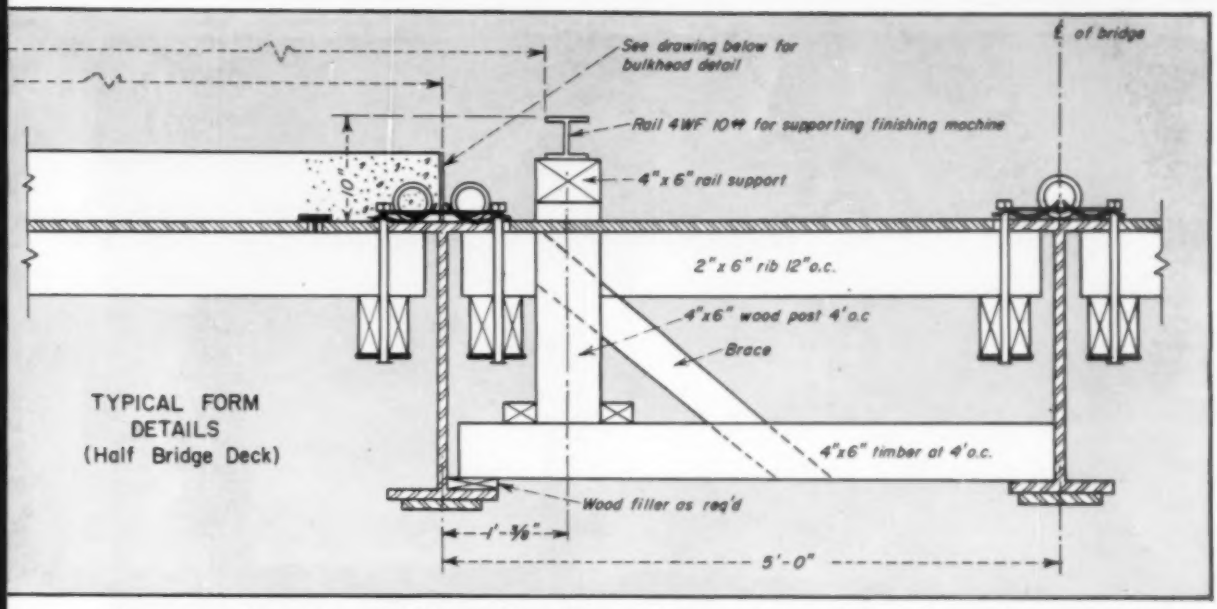
If the bulkhead were made of wood, it would be not only expensive to build but also nearly impossible to strip. So a unique solution was developed—a bulkhead composed of precast concrete blocks, foam-rubber strips, and wood.

Cast on the site in small forms, the 3½x1¾-in. blocks rest directly on the stringer flange and extend about 10 in. between bottom bars. A copper waterstop spline is placed over the blocks and covered with a ¾x2-in. removable wood-filler strip. Sponge rubber, 2 in. wide and ¾ in. thick, is laid on top of the wood filler to seal around projecting top reinforcing steel. Above the sponge rubber, a 1x3-in. wood strip is set in place and supported by removable wood posts and knee braces.

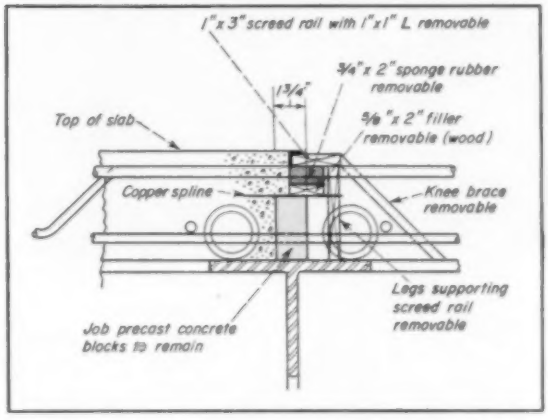
• **Transverse Expansion Joints**—Plans call for a special ¾-in. joint made of foam rubber, copper flashing, and a poured mastic. Normal procedure would be to bulkhead the deck at the joint, pour alternate bays, strip, set up intermediate forms, and pour the in-between slabs.

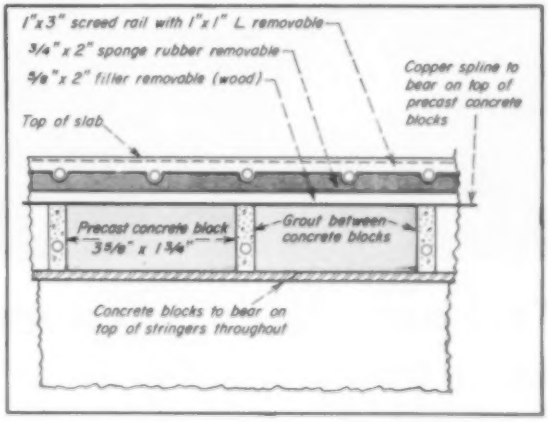
To permit continuous pouring over consecutive bays, the contractor places half-sections of concrete conduit back to back at each joint to support the copper and foam-rubber assembly. At an expansion joint, each half-section is supported along one edge by a transverse channel and along the other edge by a post resting on the concrete bent below. Joint material is placed in between.

• **Fast Materials Handling**—Lumber, steel, and concrete trucks can drive out on the bridge only as far as the last slab that has cured for 21 days. Beyond that point all materials are handled by a fleet of power buggies, 14 equipped with ½-yd. buckets and two with flat beds. Beyond the last slab that has cured for 5 days, hauls are made over a runway built over the stringers at the center mall. This runway spearheads the job.

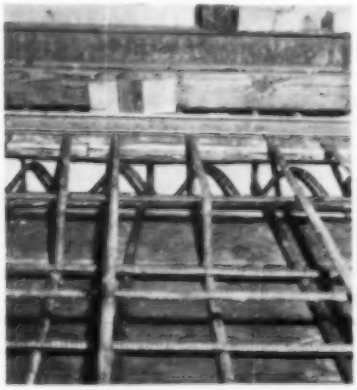


T-shaped magnesium strips. Finishing machine rides on I-beam rails. The outside rail rests on 4x6's set on 4x6 posts spaced 4 ft. on center. Posts, in turn, rest on 4x6's that span between bottom flanges of parallel stringers. Finishing screed rides top of longitudinal bulkheads. Sidewalks and center mall are poured separately.


1"x 3" screed rail with 1"x 1" L removable
¾"x 2" sponge rubber removable
1¾"
Top of slab
⅝"x 2" filler removable (wood)
Copper spline
Knee brace removable
Legs supporting screed rail removable
Job precast concrete blocks to remain


1"x 3" screed rail with 1"x 1" L removable
¾"x 2" sponge rubber removable
⅝"x 2" filler removable (wood)
Copper spline to bear on top of precast concrete blocks
Top of slab
Precast concrete block 3⅝" x 1¾"
Grout between concrete blocks
Concrete blocks to bear on top of stringers throughout

PRECAST BLOCKS and foam rubber solve tough bulkhead form problem. Not only is longitudinal form sandwiched between two lines of spiral bars, but it must also accommodate top and bottom spline and guide the screed.



FOAM RUBBER neatly seals top steel. Blocks support assembly.

EXPANSION-JOINT support consists of half-sections of concrete conduit.

FOAM-RUBBER PLANK and waterstops are set between supports.

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and to bring them safely down

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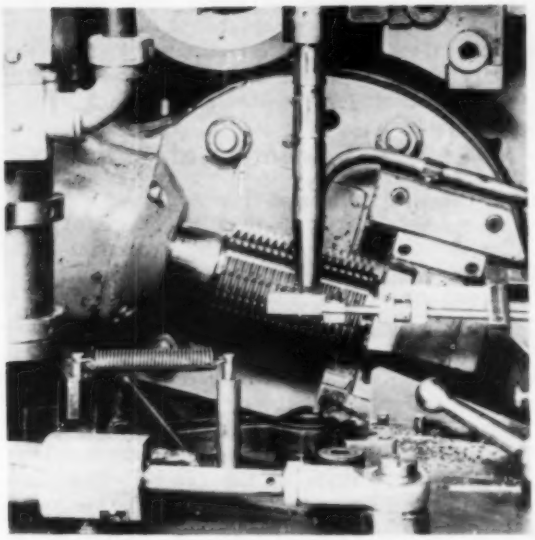
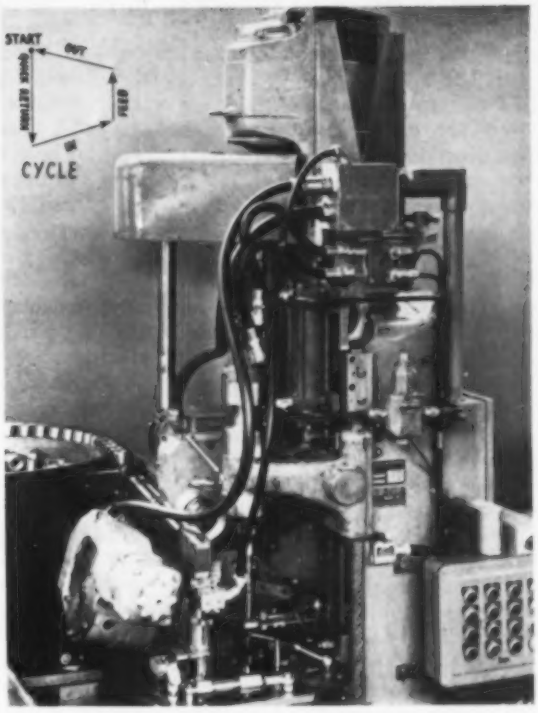
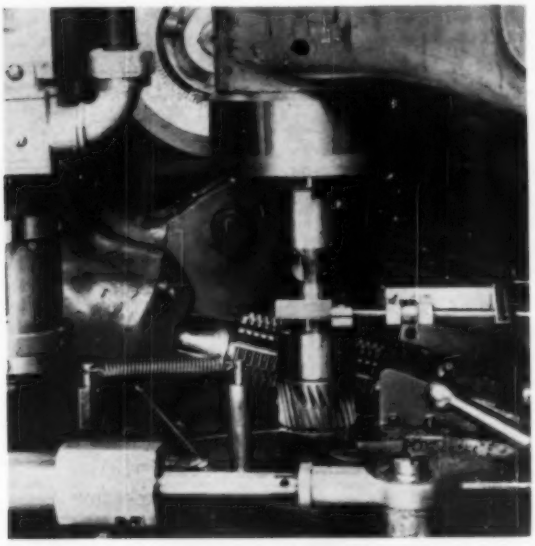


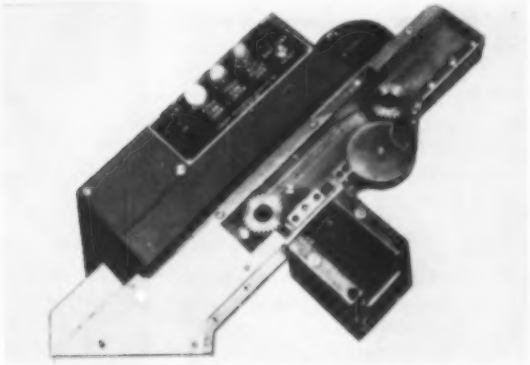
HOBBER CLOSEUP shows tailstock up. Transfer arm (foreground) extends to loading tube that leads to . . .



. . . INCLINED CHUTE of Syntron vibrating-hopper feeding unit. All functions are automatic. When . . .



. . . HOBBING is completed, the transfer arm then pushes hobbed gear into a chute leading to the . . .



. . . GEAR CHECKER, which checks pitch diameter and root-fillet buildup. Fed-back signals adjust hobber.

Hobbing Machine Resets Self

DIGESTED from American Machinist, June 6, p121 & 123—At present operating speeds, an automatic gear hobber in need of adjustment can produce a lot of scrap before the trouble is discovered by the operator or inspector. The solution is to inspect the gears at the machine automatically.

A new hobber, made by Lees-Bradner Co. (Cleveland), goes even further. It automatically loads and unloads parts and, by means of a gear checking device, adjusts pitch-diameter control and shifts the hob. The checker is made by Airborne Instruments Laboratory, Inc. (Mineola, N. Y.).

Blanks from a Syntron vibrating-hopper feeder pass through an inclined chute and are loaded, two at a time, through a magazine tube into pivoted spring-loaded jaws on a transfer arm. The arm moves the blanks to the center. The tailstock then moves down to insert an expanding mandrel into the blanks. When gears are hobbed, the transfer arm pushes them into a chute leading to the checker.

A gate wheel and rack feed gears into checking positions. At the first position, pitch diameter is

checked. At the second measuring position (as shown in the illustration), the gear is checked for root-fillet buildup.

Two sets of tolerance limits are used for each measurement on the gear. When gears are outside the checker tolerances but inside the greater blueprint, or production, tolerances, they pass on as good gears.

When the pitch diameter, however, is outside checker tolerances, the checker signals the hobber after a predetermined number (at least three) have passed through the checker. The signal adjusts the hob either in or out to correct the variation. If the setting cannot be corrected by adjusting the hob, the machine stops.

The checker, however, retains the signal that stopped the machine. It thus shows the operator what the trouble is.

When root-fillet buildup shows that the hob should be shifted to bring new cutting teeth into action, the checker signals the hobber to shift the hob. If a single small shift does not correct the condition, repeated shifts are made automatically. At completion of shifting of the hob across its face, the machine shuts off automatically and cannot be started until the hob is changed and the hob arbor retracted to its former position.

Operating experience to date indicates the value of the feedback type of checking device. Scrap can be reduced almost to nothing. Hob life is much better than when following a predetermined program of hob shifting.

In a typical case, the usual conservative practice of shifting after a given number of gears would have meant a shift after 30 gears had been cut. With the checker to control shift, 105 gears were cut before the first shift.

A checking device of this type will work equally well on a multi-spindle vertical hobber. As the checker performs for all spindles, it is made with a built-in memory that will retain the result it has checked from each spindle until that spindle returns to the unloading and loading station. At that time only does the checker activate the spindle to correct pitch diameter or to shift the hob.

Better Acetate Dyeing

Digested from Chemical Week, May 7, p66—Unveiling of a new family of dyestuffs stirred hopes that poor color fastness in dyed cellulose acetate may soon be overcome. Called Eastofix dyes, they are offered by Eastman Chemical Products, subsidiary of Eastman Kodak Co.

The dyes introduce a new technique in acetate dyeing. They call for an insolubilizing treatment subsequent to the dye bath. This added treatment, with a metal-containing fixing agent, is the secret of the high degree of fastness to washing and light. It also boosts dyeing costs.

Also new are General Dyestuff Corp.'s gas-resistant Celliton F Blue LAFR (an innovation of the familiar dispersed acetate dyes) and Yellow GGLL, reported to possess good light fastness.

The activity in this field stems from acetate's loss in business since the introduction of the acrylic and polyester fibers. Improvements in dyeing techniques will help recapture the interest of textile manufacturers, who always have liked acetate's low cost, draping qualities, and desirable hand.

Delegation of Authority

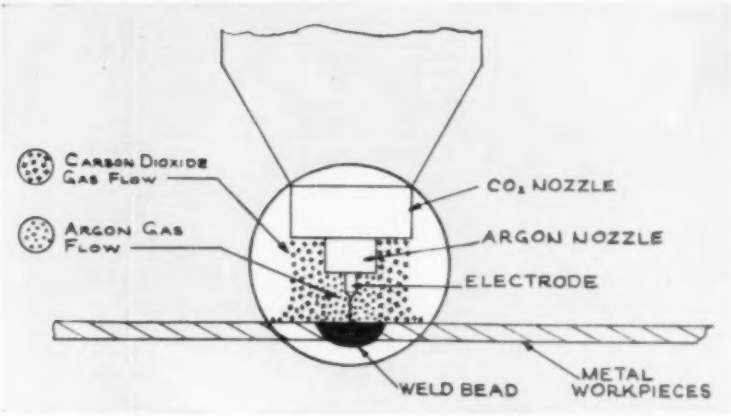
Digested from American Business, May, p9—With the growth of business and individual companies, decentralization has become a necessity.

The dictionary definition of decentralization is: the delegation of responsibility and accompanying authority to the lowest level at which proper decisions can be made. General policy must still be made in the general office, and management must define the broad areas within which those to whom authority is delegated may act.

Delegation may require some coaching. It is not always possible to turn an employee loose with a large assignment. This follow up will be appreciated if it is properly handled and should do much to increase the value of the employee.

Workplace Setup Makes Small Assembly Easy

Digested from Factory Management & Maintenance, June, p115—Place a skilled assembler in front of a table loaded with many small parts and you will probably have a none-too-efficient operation. Engineers at Crosley & Bendix Home Appliance Div. of Avco Manufacturing Corp. (Cincinnati) have come up with a cleverly designed workplace that makes difficult small-parts assembly a faster and easier job. Operator assembles circular parts on a mandrel. When assembly is complete, operator pulls unit off mandrel, places it in chute (center) that leads to a conveyor belt.



DUAL NOZZLE directs both argon and carbon dioxide downward over the weld area. Argon on the inside protects tungsten electrode from oxidation.

CO_2 Shields Arc Welds

Carbon dioxide, already claimed as a highly effective shielding gas for metal inert-gas welding, proves as good for tungsten inert-gas process

DIGESTED from Welding Engineer, June, p28—Since inert-gas arc welding was developed, there has been a constant search for a qualified shielding medium.

The most popular shielding gases—argon and helium—have proved rather costly. Other gases have been tried, some with moderate success, others with total failure. The ideal gas must shield the area from atmospheric contamination, introduce no contamination itself, be plentiful, safe to handle, and priced low.

Carbon dioxide appears to meet all these requirements. And it tends to produce stronger, more ductile welds.

Use of carbon-dioxide shielding on the tungsten arc torch requires a special torch arrangement. A conventional torch will not work properly as oxygen liberated by dissociation of the carbon dioxide near the arc attacks the tungsten electrode. The electrode will actually burn and contaminate the weld.

A dual nozzle has been developed to avoid this trouble. An inner nozzle passes a monatomic gas, such as argon, which shields the electrode. An outer nozzle passes carbon dioxide, which shields most of the weld area.

Excellent welds have been made on carbon steels, stainless steels, and related alloys—Inconel, Nimonic, and Timken. Test welds, made with both carbon dioxide and straight argon, proved that carbon-dioxide-shielded welds are as good as, and in some cases far superior to, straight argon-shielded welds.

Carbon dioxide has proved a success also as a weld backing medium. The amount of carbon dioxide in weld back-up has much more influence on weld appearance than does the amount of either argon or helium. Factors controlling weld quality are width and depth of back-up groove, gas-feed holes and their spacing, and quantity of gas.

Gas flow should be kept as low as possible. Only enough should be added to purge the underside of the weld area of atmospheric air. Back-up fixtures should have shallow backing grooves.

A cost comparison on manual tungsten arc welding with carbon dioxide and straight argon showed a 65% savings in gas cost with the carbon dioxide. This will enable manufacturers to fabricate quality weldments at reduced cost and should help expand the use of both inert-gas processes.

Suggestion Selling—Is It A Lost Art?

Digested from Sales Management, May 1, p39—A survey made in nine U. S. cities by 90 specially instructed shoppers has led to the conclusion that "very few retail salespersons really try to sell."

Shoppers were given $5 apiece and told to buy one stipulated object. If the clerk asked, "Is there anything else?" the shopper was to say no politely. But if the clerk volunteered suggestions or tried to sell additional goods, they were to buy items up to the value of $5.

One example: a shopper entered a drugstore and said to the clerk, "I would like a tube of toothpaste. I just arrived in town and lost my bag on the way." The opportunity for the clerk to suggest additional items to replace those lost was obvious, but few took advantage of it.

The 90 test shoppers started out with $450 to spend. They returned with $319.93, although they tried to spend the entire amount.

Loops Solve Problem

Digested from Engineering News-Record, June 2, p48—Deep mud presented an unusual problem to builders of a communications link at the U. S. Naval Air Station (Corpus Christi, Tex.). Shortest route lay across the mile-wide bay in which average depth of soft silt was 110 ft. A submarine cable strong enough to meet conditions would sink. Time elapsed for the cables to sink and reach equilibrium was indeterminate. So cables were laid in big loops of sufficient length to provide for settlement. At cable terminals, heavy springs will pay out extra cable if necessary to meet settlement.

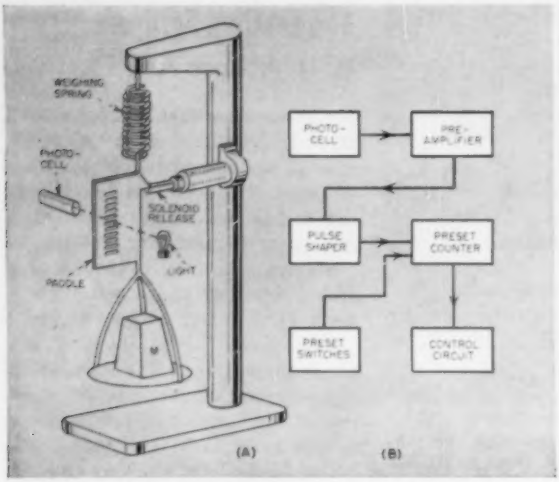


FIG. 1—Slotted plate (A) interrupts light to photocell. Pulse is sent to counter through preamplifier (B).

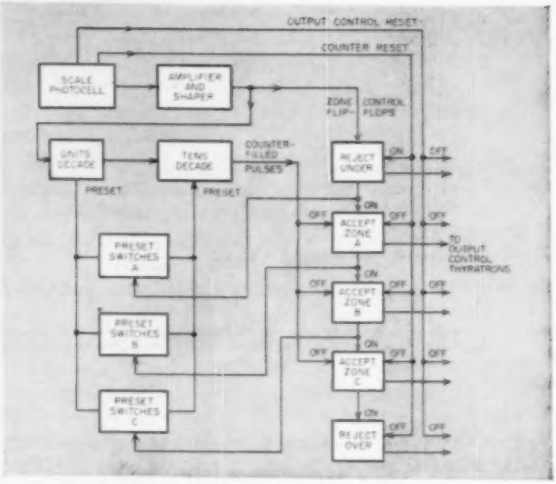


FIG. 2—Automatic weighing system provides two reject zones and three classifications of acceptable weight.

Production-Line Weighing

If weighing or sorting parts slows your production line, electronic scales may be the answer. They are fast and accurate

DIGESTED from Electronics, June, p152—With automatic production has come an increasing need for high-speed weighing. Weight information for selection or control should keep pace with the production line. Electrodynamic scales measure weight rapidly and accurately.

Figure 1A shows the operation of the dynamic scale as designed by the Toledo Scale Co. (Toledo, Ohio). There is no damping in this system. In fact, incidental damping due to friction must be eliminated. The weight platform is locked during the time weight is being placed on it or removed. When the weight is in position, the lock is released so the platform falls and the system goes through one cycle of free oscillation. Weighing time is one cycle.

The maximum excursion of the system is twice the distance from the locked platform position to the equilibrium position that would be reached by an equivalent damped system. The maximum excursion is linearly proportion to the weight and thus measures the weight.

A lightweight arm, or paddle, is mechanically coupled to the platform so that it moves with the scale platform. Slots corresponding to equal increments of weight are cut in the paddle. As the paddle moves, these slots interrupt a light beam falling on a photocell. The output pulses from the photocell are fed to a counter where they are added and stored. Weight can then be read directly from the counter or the counter can be used for control of other devices.

In industrial weighing, it is often necessary to classify articles into several weight categories, or zones. A predetermined counter permits the electrodynamic scale to do this. The zones are set up by adjusting the predetermined-count selector switches so that the desired count will fill the counter and produce a read-out signal or zone indication. Counter circuits can also be arranged to have the read-out signal reset the counter to a second zone. Any reasonable number of zones can be chosen in this manner.

The block diagram of Fig. 2 shows an arrangement for obtaining three zones of acceptable weight and an under and over zone. A two-decade counter has been chosen for purposes of illustration.

The lower limit for weight in acceptable zone *A* is set by counterbalancing the load with a tare beam or similar device. Weights less than this limit introduce no pulses to the counter. No pulses are generated when the scale is cycled under this condition. The under-zone control is turned on by a reset pulse from the scale at the beginning of the weight cycle. All other zone-control circuits are reset to the off position.

If the weight is in zone *A*, then one or more pulses are received from the scale. The first of these pulses turns the under control circuit off. An output pulse from the under circuit turns on zone *A* control and presets the counter through preset switches to the predetermined value for *A*.

If the weight is great enough to produce enough pulses to fill the counter when preset at *A*, a counter-filled pulse will be fed to all zone controls. This pulse will momentarily turn all the zone-control circuits off. Since circuit *A* has been on, it will then produce an output pulse when it is turned off that will turn on zone-control circuit *B*. This output pulse will also preset the counter again through preset switches *B*. A similar sequence of events will occur for weights in zone-range *C*.

The thyratron output-control cir-

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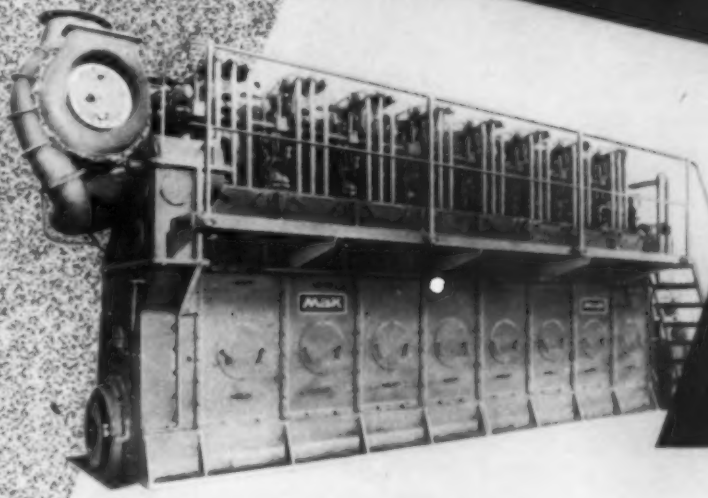

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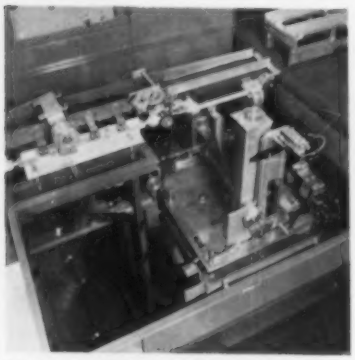
KIEL-FRIEDRICHSORT, GERMANY

cuits are keyed off for a short interval at the end of each weighing cycle. When they are again turned on, the circuit that is connected to the on zone control is energized. The thyratrons usually operate solenoid mechanical gates for directing the articles being weighed into their respective classifications bins or conveyor belts.

The automotive industry has been the first to apply this weighing technique. One manufacturer weighs and sorts all connecting rod forgings before any machining is done on them. Subsequent machining is then adjusted so that each connecting rod is machined to the same weight and has its center of gravity always located at the same point.

The scale shown handles the entire production of connecting rods of one engine plant, about 3,000



CONVEYOR-BELT SCALE sorts connecting rods into nine weight categories at rates up to 3,000 an hour.

rods an hour. Sorted rods emerge from the scale through nine separate channels. One channel contains off-weight rods (either too light or too heavy); each of the other eight channels contains a group of rods that is within a specified weight range.

Automatic and semiautomatic scales have been built to weigh automobile engine pistons. The piston is weighed to determine how much material must be removed to bring it to a specified weight. The operator reads the scale's counter and translates this information to a vertical milling or boring machine for the final operation. Such information can also be automatically read into milling machines or any such device using digital-type control devices.

PERSONAL DIGEST

SILENCE IS GOLDEN—it's an old proverb still true today. It could explain why you missed that promotion you expected, why you lost the order you thought was so sure. Discretion—call it the ability to hold one's tongue—is one of the most highly prized of all business assets. And it is in reach of everyone.

What can one lose by talking too much at the wrong place at the wrong time? He may reveal company secrets to competitors, or he may gain for himself the dubious distinction of always being "first to tell." The penalties may be severe.

More often than not, according to *Sales Management*, a man's discretion is the balancing factor in deciding whether he will remain but a cog in the works or advance to executive position. It's a factor that distinguishes men of mature judgment—one slow but certain of recognition as a valued asset.

✦ ✦ ✦

MR. EXECUTIVE'S SECRETARY—this is for you. When your employer leaves on a trip, do you hand him a schedule of transportation and hotel reservations—and alternate schedules for missed trains and canceled flights? If not, read on.

You can do a lot to make his traveling easier. Begin by learning the territory he visits and the best travel routes. Collect timetables, learn how to read them, and don't skip the footnotes or you may leave him someday standing on a platform—waiting for a train that doesn't come.

Get information on these fundamentals on travel: reservations, accommodations, credit and charge plans, baggage, and extra services.

Accommodation on railroads and airlines differ from country to country, so you should study them not only in your own country but also in other countries your employer visits. On American trains, for example, he can travel coach (the cheapest way) or in various accommodations up to drawing rooms (large enough for small business conferences).

Credit plans are convenient. On the air travel plan, available from most airlines, your employer can travel on a charge account. An air travel card, which may be domestic or international, permits him to charge tickets and pay once a month; it saves time, simplifies bookkeeping, establishes identification. Or he may travel now and pay over a period of months under a new system being widely adopted.

Other ways to help him: Check to see if his luggage is tagged, his name and address inside his briefcase, that he has his tickets, hotel confirmations, check book, driver's license, neatly typed schedule, and, if he's going abroad, visas and the necessary information on baggage, customs, and foreign currency.

✦ ✦ ✦

TWO NEW COLOR FILMS will make the amateur photographer's hobby life easier. Ansco's Anscochrome and Eastman Kodak's Ektachrome bring him two big advantages. The new films are faster than Anscocolor or Kodachrome so pictures can be taken in poor light, and they can be developed at home.

Anscochrome is available in 35 mm. and 120 and €20 film sizes. Ektacrome, now in 35 mm., will also be available in other sizes. Both Ansco and Kodak supply low-priced special developing kits that contain all the chemicals needed. One Kodak kit will develop four 20-exposure rolls.

Personal Digest has been compiled from American Business, Business Week, Factory Management & Maintenance, and other sources.

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Ex-Cell-O Power Units feed and rotate tools in easily controlled automatic cycles. A single tool can be held in the unit spindle or a multiple head can be bolted to the quill flange. The Units are used in low-cost, high-production machines for such operations as drilling, reaming, counterboring and spot-facing. A typical machine consists essentially of a plain base, a work-holding fixture and one or more power units.

Ex-Cell-O Units are self-contained and compact; can be mounted horizontally, vertically with the spindle nose down, or at any angle between these positions. For details about these units write, or cable Ex-Cell-O in Detroit.

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Cage Welds Plates

Digested from Construction Methods & Equipment, May, p90—A self-propelled cage mounting an automatic welder speeded erection of eight grain-storage tanks in Portland, Ore. Suspended from the top of the wall plate, the rig welded horizontal butt joints in one pass. An electrode was operated on each side of the plate at the same time.

Welding equipment consisted of two standard automatic Lincoln weld heads, a vacuum pickup, and four motor-generators. A rubber-tired trailer, carrying the motor-generators, was towed around the wall behind the welding cage. When one course of plate was finished, the second was set in place and the cage lifted to ride on the top edge of the next course.

New Full-Face Miner

Digested from Coal Age, June, p92—A new boring-type miner is designed for high tonnages in higher seams of coal. Made by Joy Mfg. Co. (Pittsburgh, Pa.), the miner will cut and load a full face at an 8-ton-per-min. rate.

The unit is crawler-mounted and has two boring arms and two sets of trim chains that cut an arched shape for roof control. Cut varies from 5 ft. 11 in. to 7 ft. 11 in. high and 11 ft. 8 in. to 12 ft. 8 in. wide. It bores at a rate up to 4½ ft. per min., trams at up to 22½ ft. per min. All cutting surfaces retract hydraulically for roof and wall clearance.

For the Third Month . . .

. . . we again are pleased to announce a new publication added to the list of magazines digested. The Economist, published in London, has granted us permission to quote or abstract articles from its issues. We are highly honored that this great publication is cooperating with the Digest. It will permit us to bring you much of interest and value from the wide range of material covered by The Economist.

"When is the next ship to Karachi?"

Maybe you don't have anything going to Karachi today, but if you did have you would be interested in knowing that in a typical month there are five sailings there from Newport News, Virginia along with nine to Casablanca and practically commuter service to and from Antwerp, Liverpool, Hamburg and other major ports.

More than 300 steamship lines serve Hampton Roads with about 6500 arrivals and sailings a year or an average of one every 90 minutes. In most cases, your cargo, consigned through Newport News, can be unloaded anywhere on Hampton Roads without additional cost.

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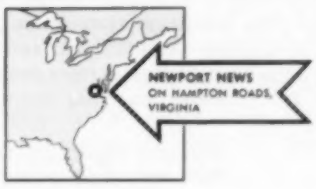

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FINANCIAL DIGEST

CONVERTIBILITY OF CURRENCIES is months away—that's the safest guess. Financiers throughout the free world talk in terms of free exchange. They all favor it.

Just *when* is another story. At present, the policy of the French, Germans, Italians, Dutch, and several others is to wait and see what the British decide. And the British, it seems, are taking plenty of time to decide.

British spokesmen say, "probably this year," when questioned on their future move. The fact is, the pound is not likely to be made convertible until the British begin earning a good overall profit from foreign transactions. This they have not done, as yet. And when they do finally "go convertible," they will adopt only a partial free exchange—a convertibility privilege for nonresidents only.

On top of all this is the question: shall the system be based on fixed or variable rates? Many Europeans fear a rigid system. They favor rate fluctuations as a safeguard. Nevertheless, Britain is expected to ask the International Monetary Fund Conference, next month, for permission to establish a variable exchange rate for the pound.

Meantime, two happenings have aided the cause of early convertibility: (1) The European Payments Union has begun modifying in its operation in preparation for convertibility—so that EPU could continue to function effectively. (2) In Washington, President Eisenhower signed a 3-year extension of the Reciprocal Trade Agreements Act, thus placing America alongside those nations that favor freer world trade.

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MODERATE INFLATION seems, after all, a likely prospect for the U. S. Unexpected guaranteed annual wage concessions (see p7), plus bigger "benefits" and hourly rate increases, are forcing a fast inflation of wage rates for millions of unionized workers. The result: an upward pressure on many prices.

Ford granted a "package" of benefits to its United Automobile Workers worth 20¢ an hour per man. This will boost the price of next year's Ford cars about $25.00. The 20¢ figure, says Ford, will jump to 32¢ per hour by 1957. Similar facts apply to General Motors, and eventually will apply to many companies.

The steel industry, having announced a wage-and-welfare boost of 15¢ per hour per man, will raise its per-ton price about $7.35, somewhat more than forecast. This means, of course, increased costs in scores of industries—including the auto industry, already burdened by higher labor costs.

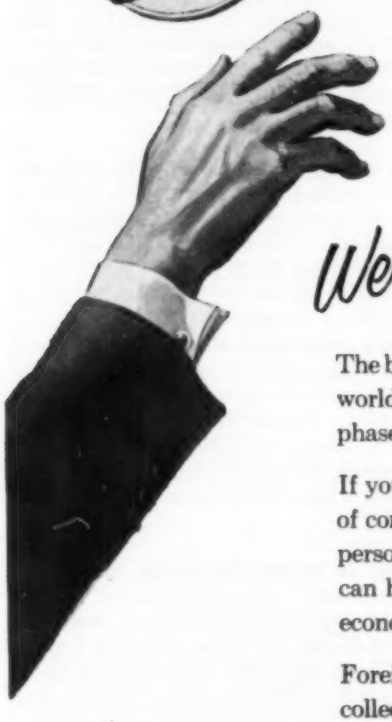
✦ ✦ ✦

AMERICAN OVERSEAS FINANCE CORP., a private concern, has been organized in New York to provide medium-term credit to buyers outside the U. S. who purchase American capital goods (McG-H Digest, Jan, p7). The new concern expects to do a financing business as high as $200-million its first year.

Five banks are backing the venture: Chase Manhattan (New York), Chemical Corn Exchange (New York), First National (Boston), Mellon National (Pittsburgh), National (Detroit).

The minimum transaction handled will ordinarily be $10,000. Financing (at 6%) will run from 6 months to 5 years. AOFC buys from U. S. exporters promissory notes issued by the importer. The importer must pay down 20% in cash and gets 80% credit.

Financial Digest, compiled from various sources, analyzes current financial trends and underlying factors.



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MANAGEMENT REPORT

Businessmen traveling to Latin America would do well to check on the holidays of the countries they plan to visit. Otherwise, they may get too many unexpected sight-seeing days. Any excuse for a holiday in Latin America may not be too accurate, but it's not too far wrong. Many countries have 15 or more. Peru celebrates 23½ regular holidays each year.

Some countries, for example, celebrate as many as three independence days. Carnival time in Rio de Janeiro and Holy Week observance in most countries bring business to a standstill. More business stoppers: anniversaries of battles, founding-fathers' birthdays, October 12 for Columbus' discovery of America, January 6 as the Day of the Three Kings. Some countries close their banks and many business firms from December 24 to January 2.

Union shop stewards outscore foremen and show higher leadership qualities—if you are looking for, say, a plant supervisor. That's one conclusion you can draw from a comparison of stewards and foremen made by Management Engineers, Inc., Chicago consultants.

When ME field men are called in on consulting jobs, they customarily train representatives from both labor and management to make time studies on various operations. To pick the best qualified men, the ME consultant tests both foremen and stewards on leadership qualities—vocabulary, practical judgment, mathematics, etc. In nearly every case the union steward outpoints the foreman. Union men have proved to be nearly 36% ahead in practical judgment and vocabulary—with an edge in mathematics.

Why the difference? ME believes foremen are originally selected for being good producers and not for leadership abilities; stewards get their jobs because they show natural abilities as leaders.—Business Week, June 11, p54

Competition is based on everything but sympathy—so said Wendell B. Barnes, head of the U. S. Small Business Administration recently, in a talk before the New Product Seminar in New York City. "Market competition is based on merit, on usefulness, on attractiveness, on price, on style, or on a dozen other criteria . . . but not on sympathy." Mr. Barnes went on to say that success in business comes largely from being able to adapt to new changes rapidly—with special emphasis on putting new and up-to-date products before the market. Those who fail to do this get . . . sympathy, but little business.

The SBA chief cited a survey showing that companies, both large and small, introduce important new products far too infrequently. Of 1,130 firms surveyed by SBA, 18% launch new items only once every 10 years. Only 7.4% introduce at least one new item every year.—Factory Management & Maintenance, June, p137

What can your union do to improve your business and its members' working situation? Here are two examples: The tile-setters union in California, faced with poor business, inspected jobs, made workers rip out bad tile jobs and reset them at their own expense. It insisted on a fair day's work; production jumped from 35 to 60 sq. ft. per day, work increased, and now California with 6% of U. S. population consumes 20% of the tile made.

The other case: Bricklayers in northwest U. S. were faced with too little work. So the union refused pay increases twice and organized a promotion and advertising group. Members are the union, dealers, contractors, and manufacturers. The group spends $1,000 a month in one city alone promoting the building of masonry structures.—Ceramic Industry, June, p31

Eight years is a long apprenticeship, but an area program in Cleveland takes that long to turn out journeyman die-sinkers. The first 4 years go into an apprenticeship on trimming dies, the next 4 on forging dies. Wages during the 8 years are a percentage of the current journeyman rate and are increased every 6 months.

The program is a cooperative effort of management and labor. It's administered by a joint committee of management and labor in cooperation with joint shop committees. The area committee approves apprenticeship agreements, registers them with the state, reviews progress reports of apprentices, sponsors completion ceremonies.—American Machinist, June 6, p153

No company has to accept Communist infiltration into its labor ranks. Take the case of central Italy's biggest chemical manufacturer, Bombrini Parodi Delfino Co. at Colleferro, which is 3 miles from Rome. In 1946-47, 80% of its workers voted for Red shop committeemen; 1949-50, 60%; last year, only 23%. During the last 5-year period, productivity rose a staggering 40%—far better than the country's average.

The company managed this healthy change by offering its employees steady employment and enlightened worker welfare measures. Company housing has turned once-rural Colleferro into a modern town with low rents. And the company's own recreation rooms, cinemas, sports grounds, gymnasiums, club rooms, libraries, and lecture halls provide employees and families with plenty of room for community life.—Chemical Week, May 28, p20

TV Saves Manhours

Digested from Factory Management & Maintenance, June, p115—Closed-circuit television has cut payroll expense for the Armstrong Cork Co. (Lancaster, Pa.). The workman shovels linoleum mix into a hopper. The mix falls three floors while being processed and then enters a set of rollers—it must enter the rollers uniformly. By viewing the downstairs end of the operation on a television screen, the shoveler can regulate the volume and placing of the mix as it enters the rolls. Formerly, a second man was stationed below to signal the shoveler upstairs.

International Business Briefs

DUESSELDORF—West Germany's television industry is growing fast; radio business, however, is leveling off. Output of TV sets during the first quarter of 1955 was 82,000—compared with only 147,000 for the entire 12 months of 1954. Output during 1955 will reach 350,000 to 400,000 sets, with about 50,000 to be exported. No change in prices is expected. For the 12 months starting July 1955, Germany will produce about 2,800,000 radio sets—no increase over '54. Of these, around 1,200,000 will be exported.

CARACAS — New industries will continue to strengthen the Venezuelan economy; 108 new industries were started in 1954 with total invested capital of $25,200,000. This represents an important start toward diversification of the economy. Most new capital—a large share of it from foreign sources—is going into manufacturing plants.

Local private capital will go into pulp and paper, fabric bags, wire nails, newsprint, cardboard. Foreign capital during 1955-56 will develop cheese and food (Kraft), tires (Goodyear), soap (Colgate-Palmolive), synthetic textiles (Celanese), pharmaceuticals (Abbott).

MANILA — Lively stepped-up trade between the Philippines and Japan is developing. Japanese businessmen, especially shipowners and shipbuilders, are driving for a sound Philippine market. Bickering over war reparations, it seems, is to end in a good commercial compromise.

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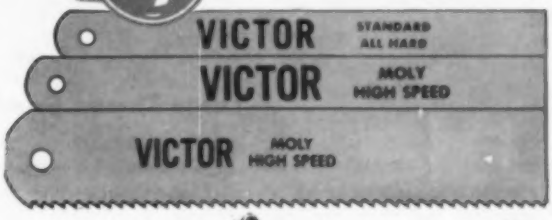

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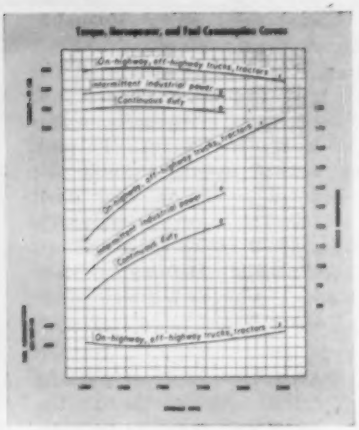

Supercharger Boosts Diesel Output, Permits More Horsepower per Pound

The JT-6, a new lightweight, 175-hp. supercharged diesel engine, is a six-cylinder, in-line type with 4½-in. bore, 5-in. stroke, and displacement of 401 cu. in. The manufacturer claims the high horsepower, light weight, diesel economy advantages, and reduction in hourly operating costs possible with the JT-6 compared with gasoline engines will appeal to contractors, mine and quarry operators using medium-heavy-duty dump trucks.

Turbocharging is the key to the high horsepower available from this small engine. The JT-6 utilizes the normally wasted energy of the exhaust gas to create added power. This is accomplished by piping the exhaust through a turbine that is one element of the turbocharger. Expansion directs the exhaust gas against the turbine blades causing the wheel to rotate at high speed.

A centrifugal impeller, mounted on the same shaft but in a separate housing, draws in fresh air and blows it into the intake manifold and cylinders under pressure. Greater weight of fresh air is forced into the cylinders and a greater quantity of fuel can be burned completely.

The exclusive Cummins PT fuel system is another important feature of the JT-6. This system has simplified Cummins diesel-engine maintenance. The PT fuel system is a continuous flow type and, consequently, needs no timing adjustment. There are no fuel racks or plunger pumps to adjust. Check valves, injector valves, float valves, and similar features of other diesel fuel systems are eliminated.

The same basic fuel pump fits all Cummins diesels. Metering of fuel is accomplished by pressure changes controlled by a pressure regulator, throttle, and governor. Fuel is metered into the fuel injector cup and is "pushed" into the combustion chamber on the down-stroke of the injector plunger. Fuel is injected as a fine spray into an open-type combustion chamber. This design gives higher efficiency and better starting characteristics than other diesel combustion-chamber designs.—**Cummins Engine Co., Inc., Columbus, Ind.**

Large Thread Grinder

A new machine, style 120 precision thread grinder, will grind 10 ft. of thread length in one setting, will accommodate work up to 12 ft. long between centers, and will hold close tolerances on form, pitch diameter, and lead. Workpieces longer than 12 ft. can be inserted through the work spindle and threads longer than 10 ft. can be ground a section at a time or by turning the work end for end.—**Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.**

Seals Out Moisture

"Humid-Trol," a new preserving container, is said to be the first "nearly perfect" moisture barrier. It is expected to save industry hundreds of thousands of dollars in the preservation of materials subject to destruction through moisture. The relative humidity inside the container can be held at 1% or higher (when desired) indefinitely and the container may be opened and reclosed without losing moisture-barrier properties of the seal.—**Lavoie Laboratories, Morganville, N. J.**

Electronic Media Sorter

The Underwood Rapid-Sort processes thousands of forms per hour. Unlike conventional punched-card sorting equipment, the new machine sorts directly such original media as sales checks, bank checks, tax bills, and job tickets.

The operator simply glances at the top copy to determine the alphabetical or numerical classification. As the proper typewriter keys are depressed, the media are whisked to the appropriate bins. Less than a ½ sec. is required for a cycle.—**Underwood Corp., 1 Park Ave., New York 16, N. Y.**

Tape Recording System

Portable magnetic-tape recording system for airborne collection of test data will perform under extremely adverse environmental conditions. It permits simultaneous recording of great quantities of data during a single flight. It will operate unattended aboard airplanes and guided missiles at distances well beyond the effective range of telemetering equipment. **—Consolidated Engineering Corp., 300 N. Sierra Madre Villa, Pasadena 15, Calif.**

Offset Printing Plates Made in One Minute

Low-cost, offset printing plates for office-type duplicators can be made in 1 min. by using a new-type direct-image paper plate with a Verifax Copier. A master is thus produced that can be placed on an offset duplicator for printing hundreds of copies.

The new method can copy any typed, printed, drawn or written original. The entire operation is carried out under normal room illumination.—**Eastman Kodak Co., 343 State St., Rochester 4, N. Y.**

Air Diffuser Controls Temperature, Volume

Temperature and volume are controlled separately in a new dual-duct high-pressure air diffuser. While total air delivery, once established, remains uniform under all operating conditions, temperature is varied by mixing hot and cold air.

Both air inlets are fitted with dampers consisting of double perforated concentric sleeves and felt-edged pistons. The two outer sleeves slide back and forth over the fixed inner sleeves, governing the size of the holes through which the air flows. At extreme positions the perforations in one damper coincide while those in the other damper are closed.

As both outer sleeves are moved simultaneously by the thermostat-actuated motor, the size of the holes in one damper increase in the same ratio as those in the other decrease, thus proportioning hot and cold air and controlling final temperature.—**Connor Engineering Corp., 500 5th Ave., New York 36, N. Y.**

Elevating End-Gates

New improved elevating end-gates for trucks and trailers have a lifting capacity of 2,000 lb. and are available in a choice of eight platforms. They ease and speed truck loading.

A major feature of the Gar Wood elevating end-gate is its simplicity of design; only three arms extend from the truck to the gate itself. Accessible, easy operating levers control all operations, including raising, lowering, opening, and closing. An overload valve protects against raising or lowering when the gate is overloaded.—**Gar Wood Industries, Inc., Wayne, Mich.**

High-Pressure Fog Fights Fires

New HH-60-BFF firefighter kills in-plant fires as fast as most conventional, full-size municipal fire trucks. Measuring only 48 in. wide and 135 in. long, it fits factory aisles and can make a full turn in a 13-ft. radius. The truck operates from any of three sources of water—the integral 200-gal. tank, direct from a standpipe, or from draft. Unit is powered by a 98-hp. industrial motor designed for slow-speed idling and driving speeds up to 25 mi. per hr. Two 100-ft. hose lines each deliver high-pressure fog (under 800 lb. per sq. in.) at the rate of 30 gal. per min.—John Bean Div., Food Machinery and Chemical Corp., Lansing, Mich.

WEED KILLERS

More crops are being harvested, more pasture land reclaimed because of chemical weed and brush killers. Many of these modern agricultural chemicals are supplied by Dow.

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In addition to agricultural chemicals, Dow supplies industrial chemicals, pharmaceutical chemicals, plus a variety of plastics . . . and the world's lightest structural metal, magnesium. Some of these may reach you bearing the famous Dow diamond, while many are hidden ingredients in other manufacturers' products . . . but the quality will always be dependable.

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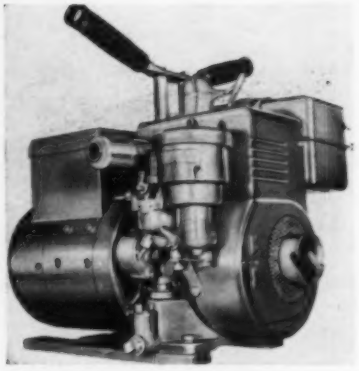
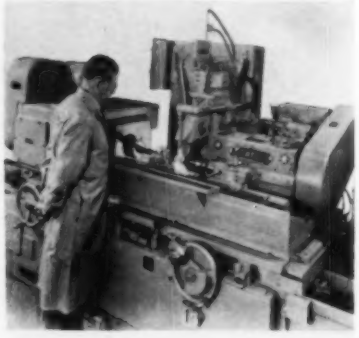


Portable Electric Plants

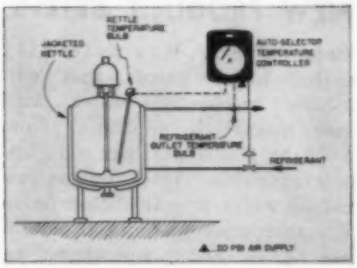
A new series of portable electric plants and battery chargers in ten basic sizes are powered by Briggs and Stratton air-cooled engines. Output ranges from 450 to 2,200 watts at 120 volts, 60 cycles. All feature choice of manual, automatic or remote control to meet individual demands. Battery chargers include 6-, 12- and 32-volt direct-current models.—**The Oliver Corp., 400 West Madison Street, Chicago 6, Ill.**



Precision Cam Grinder

A new precision cam grinder known as the No. 3 CAM-O-MATIC Automatic Cam Grinder features faster grinding of automotive-type camshafts with better finish and simpler and sturdier construction details. The use of a Gilmer timing belt produces smooth work rotation by eliminating slippage; at the same time, it requires less power.

Other improvements over former models include simplified electric and hydraulic controls for greater ease in maintenance and for simplified operation.—**Norton Behr-Manning Overseas Inc., Worcester 6, Mass.**



Polymerizing Control

The Auto-Selector controller is a one-instrument solution to problems of both freeze-up and overheating of refrigerant-cooled batch kettles in the cold polymerizing of rubber and plastics.

Recommended where the reaction is not highly exothermic, the new system uses a selective controller instead of the conventional single-action instrument.

When refrigerant outlet temperature, influenced by load changes, tends to drop below the level that might result in freezing, the controller automatically throttles the refrigerant intake valve to raise refrigerant temperature. When the cooling load drops off, the refrigerant temperature can rise above its preset minimum and the controller can again act on kettle temperature measurement, operating the valve to prevent the kettle from overheating.—**Foxboro Co., Foxboro, Mass.**

All-Silicone-Rubber Insulating System

The Silco-Flex System is the first all-silicone-rubber insulating system for large motors and generators. In the manufacture of Silco-Flex insulated stator coils, silicone rubber is applied to conductors and vulcanized in a homogeneous mass by the application of carefully controlled heat and pressure. The result is a sealed, impervious dielectric barrier, continuous around the coil and leads, which forms a flexible, moisture and heat-resistant wall over the entire coil structure.

The new insulating system offers these advantages: heat, moisture and abrasion resistance, flexibility and resilience, chemical inertness, and improved heat dissipation.—**Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.**

New Fire Extinguisher

A new pressure-operated carbon dioxide fire-extinguishing system operates on a rate-of-temperature-rise principle. It employs carbon dioxide under pressure of 850 lb. per sq. in.

By means of added devices, this basic system can be made to close vents, dampers, windows, to shut off machinery, and to sound alarms.—**Walter Kidde & Co., Inc., Belleville, N. J.**

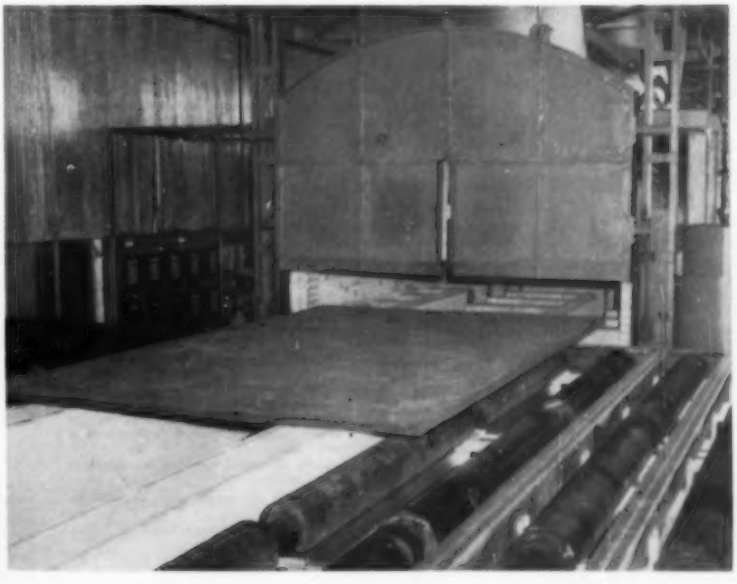
Vibrating Screens

Horizontal vibrating screen is especially suited for dewatering high capacity loads and sizing of material where headroom is limited.

The Straightline screen has two vibrators, one mounted on each side of the screen at deck level for ease of inspection. Both are located at the center of gravity, so that uniform vibration is assured. Screens are available in sizes from 4x8 ft. to 6x20 ft. with either one or two decks.—**Link Belt Co., 233 Broadway, New York 7, N. Y.**

High-Stacking Fork Truck

The "Hi-Lo Stacker," a line of battery-powered, tilting fork hand trucks in capacities of 1,500, 2,000, 2,500 and 3,000 lb., has a 24-in. load center and is equipped with telescopic channel uprights. The fork truck provides a free lift of 64 in., with an 83-in. over-all height and a maximum fork height of 130 in. Trucks can be equipped with single lift channels.—**Clark Equipment Co., Battle Creek, Mich.**



New Method for Cladding Metals

A new high-vacuum brazing method for cladding metals has been developed. Both the method and the clad product are called Hortonclad. Clad metals are available in nickel-base steel alloys such as chromium, chromium-nickel, and nickel alloys Monel and Inconel. Shown above is a plate about to enter the Hortonclad bonding furnace. The assembly of the alloy metal and the base plate, separated by a thin layer of brazing material, is heated in the furnace while a high vacuum is produced between the two metals and a resulting high pressure is maintained on the exterior surfaces. —Chicago Bridge & Iron Co., 332 S. Michigan Ave., Chicago 4, Ill.

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Trolley Conveyor—Model 228 is open-track type, with all parts readily accessible. Principal feature is flexibility as it can turn in any direction and go from one level to another in limited space. —**Rapistan-Keystone, Inc., 21750 W. 8 Mile Road, Detroit 19, Mich.**

Resists Scratches—A new water-dilutable silicone treatment that can be easily applied to give maximum scratch resistance to glass, porcelain, and china has been developed. Identified as F-4141, the treatment forms an invisible non-oily film.—**Dow Corning Corp., Midland, Mich.**

Position-sensitive Transducers—Microformers measures small displacements and are now available for general use with optional mounting attachments. These miniature variable transformers have been designed for mounting by means of tapped holes, screw lugs, or flat lugs.—**Baldwin-Lima-Hamilton Corp., 60 E. 42nd St., New York, N. Y.**

Illuminated Pushbutton—New illuminated pushbutton switch 31P-B1 features an indicating light as an integral part of the button. The small switch is designed for use in alternating- or direct-current applications using low voltage.—**Minneapolis-Honeywell Regulator Co., 2792 Fourth Ave., S., Minneapolis, Minn.**

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Utility Fans—Bulletin DS-348U describes in detail the advantages of the new belt-driven and direct-drive centrifugal fans. Catalog contains construction features and mechanical specifications.—The Trane Co., La-Crosse, Wis.

Truck Equipment—Bulletin BH-54120 covers the entire line of Heil truck equipment. Featured in bulletin are dump bodies, twin-arm hoists, sanitary refuse units, and hydraulic elevating truck tailgates.—Heil Co., 3026 W. Montana St., Milwaukee 1, Wis.

Radial Drill—Complete information and specifications on the new 3-ft. 7½-in. radial drill with flame-hardened column is given in catalog D-133.—Cincinnati Lathe & Tool Co., Cincinnati 9, Ohio.

Earthmoving Equipment—No. 6, 100-hp., 2½-yd., two-position bucket Traxcavator is completely described and illustrated in form 713-31344.—Caterpillar Tractor Co., Peoria, Ill.

Oil Filters—Complete new line of Full Flow oil filters with advanced engineering features is described in bulletin 101.—Houdaille-Hershey of Indiana Inc., Lebanon, Ind.

Automotive Equipment — Catalog WEB-X 1111 describes automotive ignition and electrical equipment.—Robert Bosch GMBH, Stuttgart, Germany.

Steel Processing—Booklet ADV 540 explains some of the practices most commonly employed in the heat treatment of steel.—Republic Steel Corp., Export Dept., 405 Lexington Ave., New York 17, N. Y.

All-wheel Drive—Bulletin 550301 describes and illustrates the all-wheel-drive features of Marmon-Herrington Ford trucks.—Marmon-Herrington Co. Inc., 1519 W. Washington St., Indianapolis, Ind.

Safety Equipment—Catalog covers respiratory devices, eye protection, hats, gloves, carboy pumps, drum pumps, and miscellaneous industrial safety equipment.—General Scientific Equipment Co., 2700 W. Huntington St., Philadelphia 32, Pa.

Draw Press—Bulletin 230 explains the purpose and the method of operation of the Clearing Clearomatic draw press in the manufacture of metal stampings.—Clearing Machine Corp., Div. of U. S. Industries, 6499 W. 65th St., Chicago 38, Ill.

Stereomicroscopes — The value of three-dimensional microscopes for medical and biological laboratory studies is described in catalog D-15.—Bausch & Lomb Optical Co., 635 St. Paul St., Rochester, N. Y.

Punched Card Machines—Folder TM 930 describes the complete line of punched-card machines, showing their use in the preparation of management records.—Remington Rand Inc., 315 Fourth Ave., New York 10, N. Y.

Water Softeners—Trouble caused by the utilization of hard water and the multiple economies effected by curing them are thoroughly discussed in bulletin 2386-A.—Permutit Co., 330 W. 42nd St., New York 36, N. Y.

Tube Cleaners—Precision-made tube cleaners, tube expanders and accessory tools manufactured by the Airetool plant in the Netherlands are described and illustrated in bulletin No. 44-N.—Airetool Mfg. Co., 302 S. Center St., Springfield, Ohio.

Fork Trucks—Folder entitled "Facts About Fork Trucks" presents an objective study of the capabilities of gasoline- and electric-powered fork trucks operating under normal conditions.—Lewis-Shepard Products Inc., Watertown, Mass.

Industrial Safety Equipment—Catalog 54 is divided into four major sections —eye protection, head protection, respiratory protection, and welding. This fully illustrated catalog is designed as a workable, everyday safety manual.—Willson Products Inc., Reading, Pa.

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Materials Handling — Trukveyors, a dragline conveying system designed to reduce the unit cost of materials handling in warehouses, truck and railroad terminals, is described in book 2497.—Link-Belt Co., 233 Broadway, New York 7, N. Y.

Rust Inhibitor—Santolene C, a petroleum additive that inhibits rust formation and overcomes the disadvantages of water-based inhibitors, is described in bulletin No. 0-62.—Monsanto Chemical Co., 1700 S. Second St., St. Louis 4, Mo.

Small-parts Handling System—Catalog DN-1000 covers all products in the NesTier line of small-parts handling equipment. Brochure illustrates, describes, and gives specifications for NesTier nesting-stacking boxes and baskets.—Chas. Wm. Doepke Mfg. Co. Inc., 8772 Blue Ash Rd., Rossmoyne, Ohio.

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Lift Truck—Bulletins 5111 and 5113 describe all the specifications and aspects for efficient operation of model K-46 electric standup hydraulic lift truck.—Yale & Towne Mfg. Co., Roosevelt Blvd., Philadelphia 15, Pa.

Air Conditioning—Helpful tips on ways to apply economical and efficient air conditioning to different types of buildings, ranging from homes to retail establishments, are outlined in booklet A-8726.—E. I. du Pont de Nemours & Co. Inc., Wilmington 98, Del.

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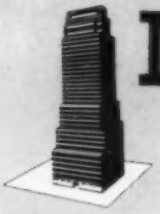

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Universal Jeep—the world's most useful four-wheel drive vehicle. Willys-Overland Export Corp.—p30, 31.

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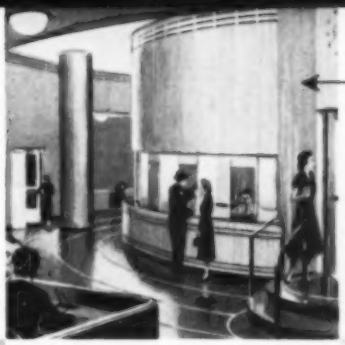

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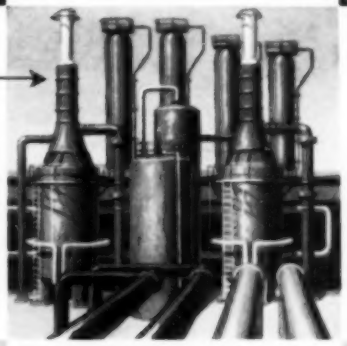

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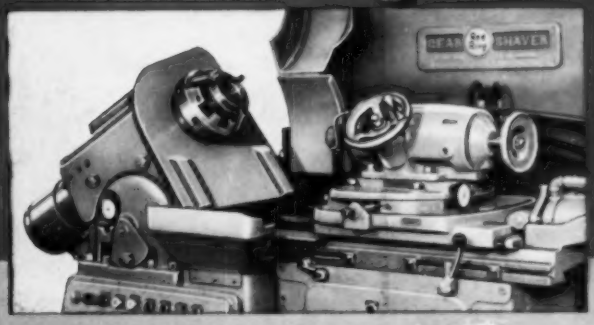

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